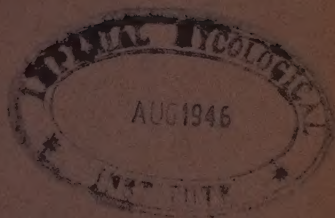


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DISEASES CAUSED BY BACTERIA AND FUNGI

SEN, S. K., & MINETT, F. C. (1944.) Experiments on the transmission of anthrax through flies.—*Indian J. vet. Sci.* 14. 149-158. 1224

The authors tested the role of *Stomoxys calcitrans*, *Musca domestica*, *Calliphora erythrocephala*, *Sarcophaga* sp. and *Tabanus orientis*, in the transmission of anthrax in goats at Mukteswar (alt. 7,500 ft.). Flies were fed on infected goats after anthrax bacilli had been detected in the peripheral circulation (often 5-8 hours before death) or on incisions in the skin of dead goats. Except for *C. erythrocephala*, which was bred in the laboratory, the flies were caught wild. After an infective feed, *S. calcitrans* failed to transmit the disease by its bites or by defaecation on the scarified or cauterized skin of goats. Both *M. domestica* and *C. erythrocephala* transmitted the disease when brought into contact with the freshly cauterized (not bleeding) skin of goats immediately after having fed on carcasses of goats dead of anthrax. *M. domestica*, infected by feeding on anthrax carcasses, failed to transmit the disease by immediate and direct contact with the eyes of healthy goats. After an infective feed, bacilli were found in the bodies of *S. calcitrans* flies up to 72 hours, in the faeces for 21-72 hours, and in the mouth parts rarely, even immediately or a few minutes after feeding.

Transmission experiments with *T. orientis* were inconclusive, as this fly did not readily bite in captivity.

The presence of anthrax bacilli and their numbers were determined by plating in agar saline suspensions from the various parts of the fly.—M. A. KHAN.

TIPPETT, S. G. (1945.) Active immunisation as against passive segregation with reference to tuberculosis.—*Vet. J.* 101. 259-262. 1225

T. pleads for the control of bovine TB. by endeavouring to enhance natural resistance rather than by systematic tuberculin testing and the elimination of reactors.—R. E. GLOVER.

BRADBURY, F. C. S., & YOUNG, J. A. (1946.) Human pulmonary tuberculosis due to avian tubercle bacilli. Report of a case.—*Lancet.* 250. 89-91. 1226

A case is described of severe pulmonary TB. in a man. Two strains of *M. tuberculosis* isolated from sputum at widely separated periods, gave the cultural characteristics of the avian bacillus and were pathogenic for rabbits and fowls following intravenous inoculation of 0.001 mg.

The origin of the infection was obscure, but it is inferred that it may have arisen from the patient's habit of consuming a raw egg every day.—R. E. GLOVER.

HALLBERG, V. (1943.) On peculiar corpuscles occurring in tuberculous material. Preliminary note.—*Acta med. scand.* 113. 412-414. [In English.] 1227

When tuberculous sputa are stained with a special combination of Night blue and Bismarck brown in

aniline water [details promised in a future article] fusiform corpuscles are occasionally seen, usually coloured a yellowish-brown. They are regarded as a developmental form of an oidium type of yeast which occurs in some sputa.—R. E. GLOVER.

DREA, W. F. (1944.) Antibacterial effects of various organic substances upon the H37 strain of human tubercle bacilli in a simple synthetic medium.—*J. Bact.* 48. 547-553. 1228

A number of organic substances, straight chain, cyclic and straight chain combined with cyclic, were added to Long's liquid synthetic medium (pH 7.2) to determine the approximate amounts necessary to prevent the growth of graded amounts of the H37 strain of human tubercle bacilli. Among the saturated fatty acids studied, the antibacterial action was most pronounced in those containing 12-16 carbon atoms in the straight carbon chain, e.g., myristic (C_{14}), palmitic (C_{16}), whereas those with 1-5 carbon atoms had little or no growth-preventing effects. The growth-inhibiting properties of the C_{12} , C_{14} and C_{16} aliphatic bases applied to the simple compounds themselves or to these joined to or combined with radicals or molecules such as benzene derivatives. The latter alone had only a weak growth-preventing power, with the exception of catechol with OH groups in the 1-2 positions. The low antibacterial power of sulphanilamide was increased by the substitution into the molecule of either the pyrimidine or thiazole nucleus. It is suggested that in merthiolate, for example, the substitution of Cd or Mn for Hg, or the addition of an aliphatic chain at the 4 position might lead to an increase of antibacterial power.

—H. I. FIELD.

WARE, F., & SREENIVASAN, M. K. (1941.) Johne's disease: ten years' observation on an experimental herd.—*Indian J. vet. Sci.* 11. 289-307. 1229

The spread of *Mycobacterium johnei* infection and the effect of vaccination by the methods described by VALLÉE and RINJARD were studied from 1929-39 in a herd which consisted of naturally infected and healthy cows and bulls and their progeny. Breeds represented included the Tharparkar, Hissar, Bihari, Assamese and Sindhi, together with cross-breds collected from different parts of India, 110 animals having been observed. Details are given concerning 95 of them. The animals were maintained under normal conditions of feeding and management and led a more or less natural life without any physical strain, other than that involved in pregnancy. The herd was periodically tested and examined with avian tuberculin except for the last test in which synthetic johnin was used.

Twenty-two calves were vaccinated at birth, an equal number being left as controls. Subcutaneous inoculations on one side of the neck were given of either

25.0 mg. *M. johnei* culture suspended in saline, or of the same amount of culture mixed with oil and sand; the latter induced more resistance to infection. Though a number of naturally infected animals and about 25% of the calves born in the herd died of infection, the disease did not spread as expected and the value of vaccination could not be correctly judged. The authors conclude that in a well managed herd there is no danger of John's disease becoming established, unless there is a very high initial level of infection in a restricted space and a relatively large proportion of highly susceptible, i.e., young animals are present.

DE SOUZA-ARAÚJO, H. C. (1943.) Infecção experimental de carrapatos (*Amblyomma cajennense*) em ratos com lepra Stefansky. [Experimental infection of *Amblyomma cajennense* with the rat leprosy bacillus by feeding on infected rats.]—*Mem. Inst. Osw. Cruz.* 38. 183-186. [English summary.] 1230

A report is given of the recovery of the rat leprosy bacillus from ticks or their faeces after they had fed on leprosy-infected rats. The author suggests that it should be possible to transmit the infection to rats by means of infected *Amblyomma cajennense*, as MARCHOUX and CHORINE were able to do with infected *Laelaps echidninus*. *Amblyomma cajennense* is prevalent in Brazil.—H. G. ARAMBURU.

— (1943.) Merkblatt über den Rotz beim Menschen. Neubearbeitet im Reichsgesundheitsamt. [Notice concerning glanders in human beings.]—*Reichsgesundheitsblatt.* 18. 123-126. 1231

The notice describes the nature and cause of the disease, and the preventive measures and treatment necessary. Methods of disinfection during and after the disease are described.—E. KLIENEBERGER-NOBEL.

GWATKIN, R., PAINTER, R. H., & MOYNIHAN, I. W. (1942.) Tularemia in sheep.—*Canad. J. comp. Med.* 6. 163-168. 1232

In a flock of 860 yearling ewes, 24 animals died and five or six animals seriously affected recovered. The animals examined were heavily infested with wood ticks (*Dermacentor andersoni*) and keds (*Melophagus ovinus*). The sandy ground near their water supply was covered with fully engorged ticks; some of these, as well as ticks from affected sheep were collected for examination.

Using "difco" cystine heart agar with the addition of 10% rabbit blood, *Pasteurella tularensis* was recovered from one infected sheep, from g. pigs which had been injected with various lymph nodes and organs from this animal, and from engorged ticks which had been removed from it. The organism was not recovered from ticks picked up from the ground.

Agglutination tests were conducted with serum from one suspected animal and a known culture of *Past. tularensis* as antigen; reciprocal tests were conducted with known *Past. tularensis* antiserum and the recovered organism as antigen. Similar tests were conducted with the recovered organism and its antiserum. None of the sera had a high aggl. titre with either of the antigens.—THOS. MOORE.

MOORE, F. D., SAWYER, C. S., & BLOUNT, S. G., Jr. (1944.) Tularemia in New England. A review of eighteen cases, with the report of two additional cases.—*New Engl. J. Med.* 231. 169-173. [Excerpt from abstr. in *Bull. Hyg., Lond.* 20. 257. Signed: R. LOVELL.] 1233

Since 1932 cases of tularemia have appeared in New England at the rate of approximately two a year; 20 cases are here brought under review. There were three deaths. Nine of the 20 cases followed the direct handling of rabbits and five were traceable to tick bites,

with the animal host unknown. One was traced to a cat bite, one to the skinning of a fox, and one followed the handling of an infected dog; the mode of transmission was not known in three cases.

Early diagnosis of tularemia is sometimes made by injecting the patients' blood or, preferably, material from an ulcer into a guinea pig and removing necrotic material from the liver and spleen, to a cystine-containing medium. The Foshay diagnostic test consists of the intradermal injection of a suspension of killed bacilli and the local reaction is examined after 48 hours; this is positive during the first week of the disease. Foshay has also described an intradermal test in which anti-serum is used, and which is read in 15 minutes, but results are less reliable than with the bacterial suspension. Agglutination tests become positive from the third to the sixth week of disease.

SCHAD, (1943.) Beitrag zur Epidemiologie, Bakteriologie und Serologie der Tularämie. [The epidemiology, bacteriology and serology of tularemia.]—*Dtsch. Militärärz.* 8. 620-621. [Abstr. in *Bull. Hyg. Lond.* 20. 81-82, copied verbatim. Signed: R. LOVELL.] 1234

In December 1941, tularemia was diagnosed by a local Russian institute as occurring amongst the country folk; the diagnosis was made by the agglutination reaction. The local doctors considered that the "internal" form of tularemia, well known to them, may be definitely diagnosed clinically. Cases of indefinite fever in the German Army also gave positive serological reactions; these cases disappeared with the warmer weather and remained absent throughout the summer. At the beginning of the period of frost in 1942 cases of fever again appeared giving positive agglutination reactions, and there were also cases with glandular swelling and eye symptoms and definitely diagnosed serologically as tularemia; the diagnosis of tularemia being no longer in doubt, steps were taken to investigate its origin.

The distribution of the cases amongst troops in different areas and living amid different circumstances pointed to the field mouse as a possible reservoir. Details are given of the observations made and mice were shown to be infected and capable of transmitting *Bact. tularensis* by their urine. *Bact. tularensis* was also recovered from a water supply.

It is presumed that contact with infected living or dead mice might lead to the cutaneo-glandular type of disease in man and that infection might take place through the gums and lead to a glandular type. Infection might also occur by washing in infected water, by consuming food soiled with infected urine and faeces, by inhalation of infected dust particles and by handling infected material.

Prophylactic measures adopted included encouragement to report the presence of dead mice, the prohibition of playing with cats, the boiling of all water and the destruction of mice.

Cases of disease were apparently occurring again by the end of February 1943, and the question of diagnosis was raised. Of the laboratory tests, the agglutination reaction was specific and was satisfactory from the 11th day of disease; the skin test was applied from the 5th to the 7th day.

SOPIKOV, P. M. (1940.) Mery bor'by s paratifom ptits. [Control of *Salmonella typhi-murium* infection in birds.]—*Rabot. XII Plen. vet. Sekt. Akad. sel'khoz. Nauk, Moscow, 1939.* [Collected Works.] pp. 195-200. 1235

S. gives little new information but reviews the aetiology, symptoms, prophylactic measures and the

public health aspect of avian paratyphoid. He suggests that since the disease is transmitted *via* the egg and the faeces, all young chicks giving a positive agglutination reaction should be destroyed, the remainder being vaccinated.—L. LEVENBOOK.

YOUNIE, A. R. (1942.) Pullorum-like infection of fowl.—*Canad. J. comp. Med.* 6. 172-173. 1236

In 1941 flocks were found to be infected with a strain of *S. pullorum* which differed antigenically from the usual type: the spread of the infection is now described. A suggestion of breed susceptibility was not sustained. The antigenic structure was studied and absorption tests with whole antigens and the heat-stable factors were carried out. The outstanding variation noted was that the standard strain had strong antigenic factors in common with *S. paratyphi-A*, while the variant rarely possessed this factor, and then only to a very limited extent. From field observations and the number of affected birds sent in for examination, it was considered that losses caused by the variant strain were considerably more serious than during previous seasons.

—R. GWATKIN.

HUDDLESON, I. F. (1945.) Prevention of brucella allergy in veterinarians.—*N. Amer. Vet.* 26. 466-468. 1237

Allergic reactions occur in a large percentage of practising veterinarians through contact with infected animals. Brucellosis may be contracted without causing noticeable symptoms or signs of disease but a state of allergy remains. The allergic reactions vary according to the degree of sensitization and the amount of exposure and may be difficult to differentiate from those seen in active infection. H. describes some cases of illness due to allergy. As preventive measures he advises the use of protective covering for the hands and arms, the application to the areas of the skin exposed to contact with infected material of brucella-agglutinating serum of high titre, allowed to remain on the skin for about 5 min., so that the allergic materials are precipitated and their passage through the skin retarded or prevented. To differentiate reactions due to allergy from active infection the patient should avoid contact with brucella-infected materials or animals for ten days. Reaction due to allergy will disappear during this period.

—S. J. GILBERT.

FAVATA, B. V., DOWDY, A. H., SEWELL, R. L., & VINCENT, J. G. (1944.) The pathology of experimental clostridial infections in dogs.—*Surg. Gynec. Obstet.* 79. 660-668. [Abst. in *Bull. War Med.* 5. 603, copied *verbatim*. Signed: J. C. CRUICKSHANK.] 1238

A large number of dogs were inoculated intramuscularly in the thigh with pure cultures of *Cl. welchii*, *Cl. septicum*, *Cl. novyi* and *Cl. sordellii*, or with a mixture of these four organisms and *Staph. aureus*. The authors describe the macroscopic and microscopic appearances produced by these infections in untreated dogs, and in dogs treated by intravenous injections of sodium sulphadiazine, penicillin and polyvalent gas-gangrene antitoxin separately or in combination. The therapeutic results are to be the subject of a later paper.

No difference in the degree of damage caused by the various species of *Clostridia* was observed. There were lesions at and around the site of inoculation and in the heart and liver, but no significant changes in any other organ. It is noted particularly that the kidneys, adrenals, body cavities and glands were free from pathological change, and no abnormality was observed in the brain and cord of the few dogs in which these organs were examined.

The muscles at the site of inoculation were necrotic,

infiltrated with dark red serosanguineous fluid, and showed bubbles of gas. In advanced cases there was total destruction, sparing only the skin, vessels, nerves and connective tissue. Histologically, there was necrosis of the muscle fibres, with disappearance of nuclei. At a late stage only a mass of fibrin and red cells remained.

The heart showed scattered areas in which there was fragmentation, swelling, loss of striation, and granular degeneration of the muscle fibres. There was vascular engorgement and occasionally a form of waxy degeneration.

The liver showed extreme engorgement with small areas of focal necrosis.

Most of the treated animals recovered, and in these there was evidence of muscle repair at the site of inoculation, and good organization of the lesions in the heart and liver. The few treated animals which died had signs of cardiac damage.

*WELER, E. (1941.) Tetanus und Umwelt. Unter besonderer Berücksichtigung der regionalen Verschiedenheit des Tetanus-Vorkommens. [Regional distribution of *Clostridium tetani* infection.]—*Inaug. Diss., Tübingen*. pp. 52. [Abst. from abst. in *Jber. Vet.-Med.* 71. 217-218.] 1239

W. discusses the problem of tetanus prophylaxis in human beings, pointing out that the regional distribution of infection in man does not always correspond to the distribution of cases in animals; these differences cannot be fully explained by faecal contamination of the soil. He produces experimental evidence that the texture of the soil plays an important part in the distribution of tetanus spores. The finer the grain of the soil, the greater its power of absorption and the richer its content of *Cl. tetani* spores. A coarse grain, light, sandy soil is soon cleared of its spores by rain. W. advocates prophylactic treatment with antiserum where justified by conditions.—E. KLIENEBERGER-NOBEL.

*TASMAN, A., & PONDMAN, A. B. F. A. (1941.) Sur la fermentation de la glucose par *Cl. tetani*. [Fermentation of glucose by *Clostridium tetani*.]—*Antonie van Leeuwenhoek ned. Tijdschr. Hyg. Microbiol.* 7. 169-179 & 242-243. [In French.] [Abst. from abst. in *Zbl. Bakt. I. (Ref.)* 144. 396.] 1240

In contrast to French workers, the authors did not succeed in making some *Cl. tetani* strains ferment glucose in various culture media. The gases which are formed, i.e., carbon dioxide and ammonia, are produced by the digestion of peptones and amino acids in the culture media. The results obtained by the French authors may have been due to the use of impure strains. When glucose is added there is an increased production of tetanus toxin, the cause of which is unknown.—J. Z.

*GEURDEN, L., THOONEN, J., & GARMART, J. (1942.) [Botulism in horses.]—*Vlaam. Diergeneesk. Tijdschr.* 11. 157-169. [Abst. from abst. in *Wien. tierärztl. Mschr.* 30. 148.] 1241

Seven horses became ill with symptoms of anorexia, slight diarrhoea and incoordination of movement a few days after a fire had occurred on a neighbour's farm. Paralysis of the hindquarters followed and all died within ten days. The temperature remained normal throughout, eliminating the possibility of Borna disease, and alkaloid poisoning or botulism were suspected. Histological and chemical examinations revealed nothing, but mice and g. pigs died when fed on the suspected foodstuffs. Smears from the stomach contents of one horse showed Gram-positive spore-forming rods, and filtrates from the blood and gastro-intestinal contents killed mice when injected parenterally. Cultures made from liver, spleen, stomach contents and drinking water showed Gram-positive rods, and after eight days at

room temperature a toxin fatal to mice was produced. Toxin neutralization experiments showed the causal organism to be *Clostridium botulinum* Type D. It was suggested that the suspected hay was contaminated by the organisms which were able to multiply and produce toxins as a result of the heat of the neighbouring fire. Cattle receiving the same food remained healthy.

—ANN F. RUSSELL.

LAMARRE, L., & LAMARRE, H. (1944). Contribution à l'étude clinique du botulisme du cheval. [The clinical study of botulism in the horse.]—*Bull. Acad. vét. Fr.* 17. 117-126. Discussion pp. 126-128. 1242

A description is given of five separate outbreaks of a condition thought to be botulism in horses. The outstanding feature was the virulence of each outbreak, several animals sometimes being affected at the same time. In general the illness began with a paraplegia affecting the animal when stabled for the night; it lay stretched out laterally with the head on the ground, respirations were dyspnoeic, following paralysis of the respiratory muscles, and death followed from asphyxia. Sensory feeling was maintained, paralysis being motor only, and hearing and sight were unimpaired; there was no pyrexia and the conjunctiva was normal. The pulse was slow and sometimes intermittent; appetite remained good but mild abdominal pain without colic sometimes occurred and constipation was common. The later cases of an outbreak tended to be more acute than early ones; in the latter, the symptoms tended to be obscure with perhaps an occasional fall, the animal remaining down about 15 min., after which it rose again; then the paralytic phase supervened rapidly bringing death in up to 10 hours. No treatment has been of value. At P.M. examination, lesions of asphyxia predominated and putrefaction was rapid. No histological lesions were found in the nervous system. In two of the outbreaks the authors incriminated the hay, the putrefying carcass of a cat being found in one sample.—H. I. FIELD.

CATANEI, A. (1945). Les effets de l'inoculation intrapéritonéale d'un dermatophyte au cobaye. Existence d'une prémunition d'origine mycosique. [Intra-peritoneal inoculation of g. pigs with *Ectotrichophyton mentagrophytes*.]—*Arch. Inst. Pasteur Algér.* 23. 21-44. 1243

Intraperitoneal inoculation of suspensions of *Ectotrichophyton mentagrophytes*, into g. pigs is followed by spread of the fungus into the blood stream and various organs where it may produce lesions and remain alive for many months. G. pigs so treated generally show an increased resistance against a reinfection of the skin. This state of "premunition" is, however, fugacious and is accompanied while it lasts by allergy.

—M. L. LEVI.

GLÄSSER. (1944). Die Bauchflechte der Ferkel. Pityriasis rosea. [Pityriasis in pigs.]—*Dtsch. tierärztl. Wschr. (Tierärztl. Rdsch.)* 52/50. 47-48. 1244

This disease, noticed in piglets 4-8 weeks of age which were being sent to market, took the form of superficial inflammatory lesions of the thin-skinned underbelly and groin. It was not seen in store pigs. The lesions started as small hyperaemic areas which gradually increased in size. As the lesions progressed, the centres tended to heal, leaving raised inflamed circumferences with pale centres. After a time several lesions became confluent and irregular areas of inflammation were produced. Pressure on these lesions caused a certain amount of pain and the piglets tended to avoid rapid movement.

The cause was thought to be a fungus which was contagious, as nearly all the piglets in one litter became infected, but the causal factor had not been isolated.

It is thought that infection gained entrance through superficial wounds or scratches of the skin.

Recovery was usually spontaneous and left no scar, but recovery could be hastened by the application of 5% salicyl, tar, or creolin ointment. Differential diagnosis of this complaint is discussed.—R. F. G. S.

THOMAS, K. M., RAMAKRISHNAN, T. S., & SRINIVASAN, K. V. (1945). The natural occurrence of ergot in South India.—*Proc. Indian Acad. Sci.* 21. 93-100. [Abst. in *Rev. appl. Mycol.* 24. 369-370, slightly amended.] 1245

The successful production of rye ergot at the Agricultural Research Station, Nanjanad, Nilgiris, in 1941-42, encouraged the expansion of the scheme, in connexion with which a survey was conducted on the Nilgiri plateau, parts of Wynad and Kodaikanal (Malabar), and Anamalais (Coimbatore) for indigenous species of *Claviceps*. Eighteen grasses were found to be infected, of which 15 are new records, the sphacelial and sclerotial stages being present on 12, while only the former occurred on the remainder. The fungi were tentatively classified in four groups on the basis of their conidial characters, viz. (1) curved or fusoid conidia, sclerotia formed, (a) smaller conidia (10.9 to 17.6 by 4.6 μ), whitish honeydew, (b) larger conidia (20.4 by 8.8 μ), dark honeydew; (2) mostly triangular conidia, 10.4 to 14.6 by 4.9 to 6.6 μ , sclerotia usually formed; (3) presumably representing *C. purpurea*, oval or round conidia, 4 to 7.4 by 2 to 3.9 μ , sclerotia developed; (4) oblong conidia, 8.7 to 13 by 4.4 to 5.8 μ , sphacelial stage only. The hosts of group (1a) are *Cynodon dactylon*, *Urochloa reptans*, *Digitaria chinensis*, and *Apluda aristata*; of (1b), *Pennisetum hohenackeri* (*P. alopecuroides*); of (2), *Chrysopogon zeylanicus*, *Heteropogon contortus*, and *Cymbopogon polyneurois*; of (3) *Brachypodium sylvaticum*, *Oplismenus compositus*, *Agrostis pilosula*, *Amphiphiopsis fulkesii*, *A. insculpta*, and *Themeda quadrivalvis*; and of (4), *T. triandra*, *Ischaemum aristatum*, *Andropogon lividus*, and *C. flexuosus*.

VAKIL, R. J. (1943). Reporting a new form of rat-bite fever or sodoku in Bombay (the gummatoid form).—*Indian med. Gaz.* 78. 68-69. 1246

The author describes four human cases of a type of rat-bite fever with gummatous lumps or swellings within the muscles and in relation to the periosteum. These swellings were characteristically tender to the touch and had a smooth surface. Three of the four cases responded to arsenical derivatives. The causal organism was not isolated.—M. M. HUQ.

SNELL, E. E., & SHIVE, W. (1945). Growth inhibition by analogues of pantothenic acid. [I.] Pantothenyl alcohol and related compounds.—*J. biol. Chem.* 158. 551-559. 1247

SHIVE, W., & SNELL, E. E. (1945). Growth inhibition by analogues of pantothenic acid. II. α - and β -substituted pantothenic acids and related compounds.—*Science*. 102. 401-403. 1248

I. Several compounds have been synthesized which are closely related in structure to pantothenic acid. Some of them are growth-promoting, like pantothenic acid, others are inert and some inhibit growth. The preparation of pantothenyl alcohol (N-pantoyl-3-propanolamine), N-pantoylethanolamine, N-pantoyl-n-propylamine, N-pantoylallylamine, N-pantoylethylamine, and N-pantoylglycine is described. The comparative potencies of these compounds as inhibitors of growth were tested using *Leuconostoc mesenteroides* as the test organism on account of its greater sensitivity compared with other micro-organisms which require pantothenic acid for growth. For *L. mesenteroides* the inhibitory powers of these compounds were, in descending order,

pantothenyl alcohol > pantoylethanolamine > pantoylethylamine > pantoylethylamine > pantoylethylamine > pantoylethylamine > pantoylethylamine. The inhibition was competitive in nature and became apparent when the amount of compound to pantothenic acid exceeded a certain value. The inhibitory effect of pantoylethylamine was compared with pantothenyl alcohol under similar conditions. The two antimetabolites have similar potencies as inhibitors for the most sensitive organisms; however, marked differences exist in the sensitivity of a given organism towards the two compounds. *L. mesenteroides* which is very sensitive to pantothenyl alcohol is extremely resistant to inhibition by pantoylethylamine.

II. The pantoyl (a γ -dihydroxy- β , β -dimethylbutyryl) derivatives of isoleucine and β -aminobutyric acid were prepared to determine whether they would inhibit growth of bacteria by interfering with utilization of pantothenic acid. N-pantoyl- β -aminoisobutyric acid and N-pantoyl-4-amino-2-butanol were also prepared and tested. All the above compounds inhibited the growth of micro-organisms which require pantothenic acid. The inhibition was competitive in nature. Results of tests are summarized in tables. Large amounts of any of these compounds (more than 5 mg. per 100 ml.) did not inhibit growth if sufficient pantothenic acid was present. Susceptibility of various organisms to a given analogue of pantothenic acid varied greatly.—E. M. J.

GOWEN, I. W. (1945.) Genetic aspects of virulence

See also abstrs. 1257, 1298, 1367, 1414, 1462 (clostridia), 1299 (fowl cholera and TR), 1308 (tularemia), 1407 (*B. subtilis*), 1410 (aspergilli), 1424 (pullorum disease), 1425 (B. anthracis), 1427 (*Altieria tenuis* in summer eczema of dogs), 1453, 1454 (salmonella), 1455, 1456, 1461 (coliform organisms), 1458, 1459 (mouldy fodder), 1460 (staphylococci), 1463 (ringworm), 1473 (caprine contagious pleuro-pneumonia), 1405-1419 (antibiotics).

in bacteria and viruses.—*Ann. Mo. bot. Gdn.* 32. 187-211. [Abst. in *Rev. appl. Mycol.* 24. 364, copied verbatim.] 1249

The author expresses the view that disease is caused by the interaction of four major variables; the genetic constitution of the host for disease susceptibility or resistance, of the pathogen for virulence or avirulence, the dose to which the host is exposed, and the many variables conventionally classed as environmental effects.

In the course of the work reviewed in this paper two different lines of the maize-wilt organism (*Phytomonas* [*Xanthomonas*] *stewarti*) were examined for phenotypical variants in the original pure stock and for mutations occurring naturally and after irradiation with X-rays. One of these lines, a dark yellow, rough type with medium-sized colony, showed three progeny mutants below and nine above the parent's rather low virulence index of 31. When the original parent stock is rather low in virulence, a mutant is frequently more virulent in type. The indexes ranged up to 70 with an average of 45. Seven of nine mutants of the second line, a large colony with a diffuse centre, showed indexes below that of the parent (index 75) and two had indexes above (81 and 78), the average virulence being 62. The author cites the results of Holmes's studies on mutations derived respectively from a masked and a distorting strain of tobacco virus which agree with his experiments on *X. stewarti* in showing a persistence of virulence type even with marked changes in other characteristics.

DISEASES CAUSED BY PROTOZOAN PARASITES

*RODHAIN, J., VAN GOÏDSENHOVEN, C., & VAN HOOF, L.
(1941.) Etude d'une souche de "Trypanosoma
cazeloui (vivax)" du Ruanda. [Research on a
strain of *Trypanosoma vivax* from Ruanda].—
Mem. Inst. Colon. belge. 11, pp. 38. Brussels : G. van
Campenhout. [Abst. from abst. in *Bull. Inst.*
Pasteur 42, 164.] 1250

A strain of *T. vivax* from the Belgian Congo, isolated in the zoological gardens at Antwerp, was found to have little pathogenicity for horses or for European cattle. A light infection was obtained in rabbits, but subinoculation was unsuccessful. The strain was sensitive to antimony salts and appeared to have lost the power of developing in *Glossina palpalis*; the sera of infected animals gave positive complement-fixation tests with *T. equiperdum*.—U. F. RICHARDSON.

WILDE, J. K. H., & FRENCH, M. H. (1945.) An experimental study of *Trypanosoma rhodesiense* infection in zebu cattle.—*J. comp. Path.* 55. 206-228. 1251

Six zebu cattle were inoculated with a strain of *T. rhodesiense* and trypanosomes appeared in the blood of all the animals at intervals of 7-13 days. Thereafter the parasites disappeared and reappeared at spasmodic intervals for several months. The blood of three of the oxen contained the parasite for at least six months, whilst it appeared that the other three had thrown off infection within six months, as their blood was no longer infective to goats. There was no loss of weight during the observations. In the early stages of infection a reaction was produced, evidenced by a certain fluctuation of temperature and by an increase in the euglobulin and a decrease in the albumin content of the blood. This change in the blood protein was smaller than that noted in *T. congolense* infections. There appeared to be no significant changes in the blood cells or blood sugar.—U. F. RICHARDSON.

MUNIZ, J., & DE FREITAS, G. (1944). Contribuição para o diagnóstico da *Doença de Chagas* pelas reações de imunidade. I. Estudo comparativo entre as reações de aglutinação e de fixação do complemento. [Diagnosis of Chagas' disease by immune reactions. I. Comparison of the agglutination and complement-fixation reactions.]—*Mem. Inst. Osw. Cruz.* 41. 303-333. [English summary.] 1252

Investigations carried out into the comparative value of aggl. and c.-f. tests for the diagnosis of *Trypanosoma cruzi* infection showed agreement in 25 cases, but the aggl. test was negative in one case which was positive to both complement fixation and the feeding of reduviid bugs.

For use in the tests, *T. cruzi* was cultured on broth, glucose, rabbit-blood agar in Erlenmeyer flasks covered by a thin layer of liver broth glucose, a single Erlenmeyer flask containing only 25 ml. producing 0.5 ml. of packed flagellates. Davis' antigen, consisting of cultured *T. cruzi* with 1:10,000 merthiolate solution as preservative, gave the best results for the c-f reaction. For aggl. tests, cultured trypanosomes were washed in saline by centrifugation, suspended in fresh saline and kept at 5°C., at which temperature they remained serviceable for a week.

Whilst a case of leishmaniasis gave a positive c.-f. reaction with this antigen at low serum dilutions, the aggl. test was negative. Positive aggl. reactions were given at low serum dilutions by certain cases of syphilis and leprosy and by a horse infected with *T. equinum*. *Leishmania braziliensis* and *T. equinum* antigens gave positive c.-f. reactions with Chagas' disease serum and *L. braziliensis* suspension was agglutinated by the same serum even when highly diluted.

Complement fixation is considered to be the more reliable test, but agglutination is worth further study.

—U. F. RICHARDSON.

HAMMOND, D. M., & BARTLETT, D. E. (1945.) Pattern of fluctuations in numbers of *Trichomonas foetus* occurring in the bovine vagina during initial infections. I. Correlation with time of exposure and with subsequent estrual cycles. II. Application in diagnosis.—*Amer. J. vet. Res.* 6. 84-90 & 91-95. 1253

I. Five virgin heifers, together with one heifer served without conception on two occasions by a clean bull and one cow which had completed two normal pregnancies with normal calves, were served by one of three bulls, two of which were infected with trichomoniasis artificially [see *V. B.* 14. 84], and one which was infected naturally. All animals were examined at weekly intervals for several months prior to infection and daily after service by an infected bull. Vaginal samples were obtained with glass pipettes, one being used for each animal and 7 ml. of 0.7% NaCl solution being injected into the vagina and the washings immediately aspirated. The concentration of trichomonads was estimated by means of a haemocytometer. Sometimes the collection of a sample containing blood was the only evidence of the occurrence of oestrus, which was presumed to have taken place 2-3 days previously.

Six females became infected as the result of a single exposure, and one on second exposure to one or other of the infected bulls. All animals returned to oestrus, although three cases delayed 32, 29, and 27 days respectively before their first return: long enough to justify a suspicion of a transient pregnancy. The subsequent oestrous periods were moderately regular. Trichomonads were first observed on an average of 8.3 days after the coitus which initiated the infection. Following the first return to oestrus the infection persisted through two oestrous cycles in two females, three cycles in two females, and four cycles in the remaining three females. The average interval from the first to the last positive examination was 84 days.

After the first observation of trichomonads in vaginal discharges they were constantly recovered in all infected animals up to the first return of oestrus, and in appreciable numbers from the 12th-19th days. After the first return to oestrus the incidence of the recovery of the organism followed a characteristic pattern. From the first to the second oestrus, organisms were usually in low numbers in the early part and in large numbers in the later part of the cycle. In subsequent cycles organisms were usually absent in the first part of the cycle. There was usually no gradual diminution of infection, but the organisms finally failed to appear in the late part of the oestrous cycle. The authors noted a decrease in activity of the organism before and after oestrus.

A resistance hypothesis was presented to explain the periodic appearance and disappearance of the organism in vaginal samples. It was suggested that the vagina undergoing a primary infection would support the organism and allow multiplication to take place; after 2-3 weeks this induced a resistance in the vagina, and multiplication was no longer possible. The uterus, whether infected at the same time as or after the vagina, apparently required a longer time to develop a resistance. Thus an occasional discharge through the cervix from an infected uterus into a resistant vagina accounted for the periodic appearances of the trichomonads in vaginal samples during the later stages of infection. This hypothesis was elaborated, and supported by interpretation of the results of these infection experiments.

II. The authors stated that since the definite diagnosis of trichomoniasis depended on the demonstration of the organism, the observations made in the above

paper would increase the number of animals from which vaginal samples might be usefully collected by the clinician. Thus in addition to examining discharges from cases of pyometra, very recently aborted animals, aborted foetuses and membranes, and those animals showing intermittent vaginal discharges, he should also examine animals first exposed to infection 12-19 days before the examination was carried out and thereafter for several days preceding the anticipated subsequent second and third return to oestrus.—A. E. PIERCE.

SILVA LEITÃO, J. (1945.) "Pónos" canina. [Canine leishmaniasis in Portugal.]—*Rev. Med. vet., Lisboa*. 40. 229-243. [English & French summaries.] 1254

Attention is drawn to the prevalence of canine leishmaniasis in Portugal. In Lisbon it has been estimated that 3-4% of dogs are infected. As a check on the value of diagnostic methods, a full investigation was made of a clinical case of leishmaniasis in a dog from Coimbra. Positive results were obtained by examination of smears of tibial bone marrow and of the contents of cutaneous ulcers, and the formol-gel and Takata-Ara reactions were positive. Blood, liver, skin and ungual matrix smears were negative, as were serum-flocculation and the neostibosan and formol-neostibosan reactions.—U. F. RICHARDSON.

ENICK, K. (1944.) Weitere Untersuchungen zur Überträgerfrage der Pferdepiroplasmose. [Further experiments in the transmission of equine piroplasmosis.]—*Arch. wiss. prakt. Tierheilk.* 79. 58-80. 1255

Rhipicephalus sanguineus, *R. bursa*, *Hyalomma marginatum*, *H. anatolicum* and *H. dromedarii* are recognized as vectors of both *Babesia caballi* and *B. equi*; *Dermacentor marginatus* and *D. silvarum* also transmit *B. caballi* and *R. eversti* transmits *B. equi*. Experiments now recorded add *D. pictus* [= *D. albopictus*] for both piroplasms, *H. volgense* for *B. caballi*, and *H. walense* and *D. marginatus* for *B. equi*. No transmission of either piroplasm was obtained with *H. aegyptium* or *Ixodes ricinus*. *B. caballi*, but not *B. equi*, was passed to the next generation of *H. volgense* by hereditary transmission. This tick attacks stock in winter and may be responsible for winter piroplasmosis. It is peculiar amongst the *Hyalomma* in that it is largely a one-host tick.

B. caballi was shown to be able to persist through four generations of ticks fed on rabbits and dogs in the cases of both *R. sanguineus* and *H. dromedarii*, but in only one experiment, in which *H. anatolicum* was used, did *B. equi* persist to the second generation.

Transmission of *B. caballi* did not occur when ticks were allowed to engorge for only 48 hours and in view of the different incubation periods by inoculation and by tick transmission it is suggested that ticks do not infect until five days after they have begun to feed.

Experiments on winter survival showed that neither *Boophilus* nor *Hyalomma* could survive even a mild winter in northern Germany. *R. sanguineus* and *R. bursa* could survive the winter both as larvae and nymphs, but the tick least affected by cold was *D. pictus*, which it is suggested is the principal carrier of equine piroplasmosis in central Russia.

A map is given showing tick distribution in western Russia, as compiled from German army observations.—U. F. RICHARDSON.

WILSON, S. G. (1945.) Some factors affecting the incidence of East Coast fever in Northern Province, Nyasaland.—*J. S. Afr. vet. med. Ass.* 16. 47-52. 1256

In Northern Nyasaland the occurrence of East Coast fever is strictly seasonal, most deaths occurring among the three hot rainy months of January, February and March.—E. M. ROBINSON.

I. NIKOL'SKIĬ, S. N., DESYATOV, F. M., & MALAKHOV, N. V. (1940.) Infektsionnaya zheltukha (ikterogemoglobinuriya) krupnovo rogatovo skota na Severnom Kavkaze. [Infectious jaundice (icterohaemoglobinuria) in cattle in North Caucasus.]—*Rabot. XIII Plen. vet. Sekti. Akad. sel'khoz. Nauk, Moscow, 1939.* [Collected Works.] pp. 109–110. 1257

II. ZEMSKOV, M. V. (1940.) Rezul'taty bakteriologicheskikh i klinicheskikh issledovaniĭ ikterogemoglobinurii krupnovo rogatovo skota. [Results of bacteriological and clinical investigations of bovine icterohaemoglobinuria.]—*Ibid.* pp. 111–113. 1258

I. The authors could not confirm that bovine icterohaemoglobinuria was caused by either a leptospira or a filtrable virus, as had been previously suggested. Their results indicate that the causal organism is an obligatory anaerobe, allied to *Clostridium welchii*, and found in the blood.

As therapeutic measures, the sera from animals recuperating from the disease were profitably employed, as were substances that had a purging action on the stomach and increased the "tone" of the gut.

II. In order to discover the causal organism of bovine icterohaemoglobinuria, attempts were made to

See also absts. 1395 (piroplasmiasis), 1428, 1429, 1432 (trypanosomes), 1430 (leishmania), 1431 (malaria), 1464 (*Spirochaeta gallinarum*), 1471 (bovine trichomoniasis).

DISEASES CAUSED BY VIRUSES AND RICKETTSIA

OLITSKY, P. K., & CASALS, J. (1945.) Concepts of the immunology of certain virus infections.—*Bull. N.Y. Acad. Med.* 21. 356–374. 1260

There are no new observations in this review. The subject is considered under the headings of influence of age on susceptibility and on the immune response, the correlation of antibody with immunity to reinfection, neutralization, tests, active and passive immunity, duration of immunity, and non-specific response.

—R. E. GLOVER.

*BIELING, R. (1942.) Impfstoffe gegen virusbedingte Krankheiten. [Vaccination against virus diseases.]—*Abh. Med.-Chem. Forschstätten I.G. Farbenindustrie A.-G.* 4. 433–464. [Abst. from abst. in *Jber. Vet.-Med.* 71. 277.] 1261

B. discusses the practicability of immunizing against virus diseases and preparing vaccines for them, particular consideration being given to the new vaccines for spotted fever and their evaluation by experiments in mice and g. pigs.—U. F. RICHARDSON.

FLÜCKIGER, G. (1945.) Lutte internationale contre la fièvre aphteuse par vaccination. [International control of foot and mouth disease by vaccination.]—*Acta trop., Basle.* 2. 23–41. [In French: English & German summaries.] 1262

When the outbreak of war prevented the realization of the 1939 resolution of the Comité de l'Office International des Epizooties for international co-operation in the production and use of F. & M. disease vaccine, the Swiss government created an institute in Basle for the production of Waldmann's vaccine, designed with his assistance and completed in 1942. There is accommodation for 38 cattle for virus production, each batch providing 450–500 litres of vaccine; two batches can be dealt with twice weekly. Prior to inoculation of the tongue with virus, the cattle are narcotized by the intravenous injection of 10–20 g. of sodium phenylethylbarbiturate [soluble phenobarbitone], some being still under the influence of the drug when slaughtered 24 hours later. The vaccine is tested for inactivation by the German routine of simultaneous inoculation of the tongue of one animal with four dilutions of the vaccine

infect calves with aerobic and anaerobic bacteria and with "*Spirochaeta-Vibrio icterohaemorrhagica vitulorum*" [= *Leptospira icterohaemoglobinuriae*?], obtained from infected cattle. These attempts were entirely unsuccessful.

As a result of agglutination reactions with sera from recently infected animals, it is concluded that leptospira undoubtedly play a major role. [In a later paper (SEMSKOW—V. B. 12. 338), Z. concluded that *L. icterohaemoglobinuriae* was the true causal agent in this disease.]—L. LEVENBOOK.

ANGULO, L. N. (1945.) La susceptibilidad de los animales domésticos y salvajes al *Spirochaeta hispanica*, agente etiológico de la fiebre recurrente mediterránea. [Susceptibility of domestic and wild animals to *Spirochaeta hispanica*, the agent of Mediterranean relapsing fever.]—*Rev. Ib. Parasit.* 5. 111–120. 1259

A review is given of the literature dealing with the susceptibility of animals to *S. hispanica*. A. himself found that bats, ferrets and hedgehogs developed recognizable infections. He denies that swine develop any infection, even an inapparent one; he also found canaries and chameleons to be resistant.—U. F. R.

[see MÖHLMANN & STÖHR—V. B. 15. 261]. The efficacy of the vaccine is tested by wiping a virus-soaked cloth on the scarified tongue of four vaccinated cattle and 1 or 2 controls two weeks after vaccination. All the water from the "infected" premises is heated to 80°C. for 20 min. in an automatic electrically controlled sterilizing tank. The manure from the animal house and the stomach contents of the slaughtered cattle are sterilized in a large autoclave.

Future control measures for the disease in Switzerland include the immediate slaughter of infected animals, the vaccination of animals in contact with the focus of infection, disinfection, and restriction of the movements of human beings, animals and animal products, etc.

F. also discusses the importance of vaccination in tropical countries and the necessity of having a vaccine with a smaller dose capable of withstanding long periods of storage, not always at a temperature as low as 8°C. —W. M. HENDERSON.

SCHOENING, H. W., & CRAWFORD, A. B. (1945.) Outbreak of vesicular stomatitis in swine and its differential diagnosis from vesicular exanthema and foot-and-mouth disease.—*Circ. U.S. Dep. Agric. Wash.* No. 734. pp. 14. 1263

A detailed report is given of an outbreak of vesicular stomatitis among swine in a commercial serum production establishment at Kansas City. The authors believe that this is the first recorded outbreak of the disease occurring naturally in swine. 417 out of one batch of 787 pigs developed the disease. The diagnosis was confirmed by experimental transmission of the disease to cattle, horses, swine and g. pigs. The virus strain was later identified as being of New Jersey type. The source of the outbreak remains unknown.

—W. M. HENDERSON.

SCHWANNER, E. (1943.) Über den Erfolg der obligatorischen Wutschutzimpfung der Hunde in Ungarn. [Results of compulsory rabies control in dogs in Hungary.]—*Dtsch. tierärztl. Wschr. [Tierärztl. Rdsch.]* 51/49. 221–223. 1264

Efforts were commenced in 1929 to control rabies.

among animals in Hungary by vaccination of dogs. The vaccine used consisted of phenol-attenuated fixed virus, viability of the virus being demonstrated before issue by death of at least one of three rabbits inoculated subdermally. From 1929-32, 16,669 dogs were vaccinated, six of which developed rabies 3-21 days after inoculation. Following this encouraging result, compulsory vaccination was successfully tried on a limited scale in 1933-34. In 1935 the Ministry of Agriculture introduced a measure for compulsory annual vaccination of all dogs; this was put into effect by districts, starting with Budapest and its environs in 1935, until finally all the country was covered by 1942. The number of dogs vaccinated ranged from 85,730 in 1935 to 981,343 in 1941. From 1925-28 (before vaccination was used) the annual number of cases of rabies in dogs, cats and farm animals was 1,147-1,410, 73-93 and 298-413 respectively. From the start of vaccination the numbers gradually fell to seven cases in dogs, one in a cat and two in farm animals in 1941. Complete statistics are given for each year. The success of this campaign is attributed to the use of live virus in the vaccine and to the efficient organization that has been developed.

—W. M. HENDERSON.

FERREIRA, J. (1944.) Reactivação do vírus rabico. [Reactivation of the rabies virus.]—*Rev. Med. vet., Lisboa*. 39. 23-66. 1265

In an attempt to demonstrate reactivation of inactivated rabies fixed virus, F. showed that a 1:6 suspension of ass nervous tissue in 1% formal-saline was incapable of infecting two rabbits and two solipeds when injected intracranially, but if diluted 1:50 with physiological saline solution or if the formalin was neutralized by ammonia, the inoculum was then capable of infecting solipeds but not rabbits. Passage in solipeds exalted the virulence of recovered virus so that it was once more capable of infecting rabbits. The same phenomenon could not be demonstrated with 0.4% formalin-treated virus, since this concentration was insufficient to cause complete inactivation in the first place.

The significance of these findings is discussed with reference to the occurrence of post-vaccination encephalomyelitis.—H. G. ARAMBURU.

KERLIN, D. L., & GRAHAM, R. (1944.) Studies on certain filtrable viruses. VI. Antigenic properties of entire embryo fowl pox vaccine. VII. Antigenic properties of entire embryo fowl pox vaccine.—*Proc. Soc. exp. Biol., N.Y.* 55. 225-226 and 57. 259. [For previous parts, see *V.B.* 14. 413.] 1266

VI. Fowls inoculated with fowl-pox vaccine consisting of a composite of various tissues from infected eggs were tested for immunity one year later: only three birds out of 71 (4.23%) were susceptible, as compared with all of ten unvaccinated controls simultaneously exposed to the test virus which comprised a 1:100 suspension of infected embryo.

VII. Two years after vaccination, 179 protected birds from the same flocks were tested; 96.68% proved to be immune.—R. E. GLOVER.

FRANCIS, T., JR. (1945.) Influenza: methods of study and control.—*Bull. N.Y. Acad. Med.* 21. 337-365. 1267

In general, no fresh observations are reported in this review. Human influenza is considered under the headings of study of virus, pathogenesis, the clinical disease, epidemiology and prevention.

Two points, however, may be mentioned. F. has observed that strains of *H. influenzae*, which by themselves are harmless when given intranasally to mice, become established if administered several days after

a minimal, non-fatal virus infection. He also notes that immune serum sprayed into the nostrils of human volunteers failed to prevent infection.—R. E. GLOVER.

FISHER, J. W., & SCOTT, P. (1944.) An epizootic of influenza A in a ferret colony.—*Canad. J. publ. Hlth.* 35. 364-366. 1268

An epizootic of influenza occurred in an isolated colony of uninoculated ferrets: over 95% of the 156 animals were infected and two died. There was serological and immunological evidence that the aetiological agent was influenza A virus. The source of the infection was probably a male attendant.—P. J. G. PLUMMER.

BURNET, F. M., & STONE, J. D. (1945.) The significance of primary isolation of influenza virus by inoculation of mice or of the allantoic cavity of chick embryos.—*Aust. J. exp. Biol. med. Sci.* 23. 147-150. 1269

Initiation of infection by the "O" phase of influenza A virus in mouse lung or in the allantoic cavity of the chick embryo is irregular and requires a relatively high concentration of virus. Amniotic inoculation of chick embryos 13-15 days old is the method of choice for primary isolation [see *V.B.* 16. 188].

Methods for the primary isolation of influenza virus A are summarized.—L. HART.

— (1944.) Use of gelatin in the influenza red cell agglutination test. [By the personnel of U.S. Navy Medical Research Unit No. 1.]—*Science*. 99. 520. [Authors' summary copied *verbatim*.] 1270

A 0.1 per cent. gelatin solution has been found to be a satisfactory substitute for the normal rabbit serum included to facilitate the reading of agglutination in red blood cell tests with influenza virus.

SHARP, D. G., TAYLOR, A. R., McLEAN, I. W., JR., BEARD, D., & BEARD, J. W. (1945.) Densities and sizes of the influenza viruses A (PR8 strain) and B (Lee strain) and the swine influenza virus.—*J. biol. Chem.* 159. 29-44. 1271

Experiments on the sedimentation velocity of swine influenza virus in sucrose solution gave values similar to those previously obtained with influenza viruses A and B respectively.

Sucrose is not, however, entirely suitable since under osmotic influence water is drawn rapidly from the particles, which may then become significantly modified. The use of bovine albumin, which has a low osmotic pressure, is therefore recommended. In this substrate, the densities of influenza A and B and of swine influenza viruses were calculated as 1.104, 1.104 and 1.100, and the average particle sizes as 116, 124 and 117 m μ respectively.

In solutions of sucrose there is a period of increase in apparent density, followed by a substantial decrease. In order to explain this phenomenon, the authors postulate the existence of a membrane enveloping the particle and permeable to sucrose but not to bovine albumin.—R. E. GLOVER.

HENLE, W., & HENLE, G. (1945.) The toxicity of influenza viruses.—*Science*. 102. 398-400. 1272

The intraperitoneal or intravenous inoculation of mice with undiluted allantoic fluid infected with certain strains of influenza virus resulted in death within 16-72 hours. The reaction is attributed to a toxic fraction which causes severe cellular changes, in particular a widespread necrosis of the liver parenchyma and hyperaemia and oedema of other organs. Toxicity was a transitory property of the allantoic fluid, since the quick-acting effect on mice disappeared at an early stage of incubation and at a time when infectivity by the usual intranasal route was still high.

In other respects, the toxin behaved like influenza virus, *viz.*, it sedimented at 20,000 r.p.m. in 20 min., was adsorbed on and eluted from chick red cells, and was neutralized by immune serum; it was also inactivated by ultraviolet light, formalin, etc.

The possibility is discussed that fluctuations in severity of influenza epidemics may be partly attributable to variations in the capacity of different strains to produce a toxic fraction.—R. E. GLOVER.

SHMANENKOV, N. A. (1940.) Fiziko-khimicheskie svoystva spinno-mozgovoi zhidkosti loshadei i ikh izmenenie pri infektsionnom entsefalomielite. [Physico-chemical character of spinal fluid in horses and its changes during equine encephalomyelitis.] —*Rabot. XIII Plen. vet. Sekt. Akad. sel'khoz. Nauk, Moscow, 1939.* [Collected Works.] pp. 139-142. 1273

The accompanying table summarizes the author's experimental data.

Russian Type Equine Encephalomyelitis

	pH	SPECIFIC GRAVITY	VISCOSITY	SURFACE TENSION	SPECIFIC CONDUCTIVITY	REFRACTIVE INDEX
Blood Serum (a)	7.58	1.027	1.881	0.922	102×10^{-4}	1.3500
Spinal Fluid (a)	8.18	1.006	1.020	0.960	120×10^{-4}	1.3350
(b)	7.48	1.006	1.032	0.987	127×10^{-4}	1.335
Spinal Fluid after 24 hours dialysis against distilled water (a)	6.94	1.0003	1.006	0.993	5×10^{-4}	1.333
(b)	7.18	1.0004	1.0008	0.994	11×10^{-4}	1.333
The external distilled water after dialysis (a)	8.3	1.003	1.026	0.959	119×10^{-4}	1.335
(b)	9.0	1.004	1.032	0.965	120×10^{-4}	1.335

NOTE: (a) signifies the normal control horse, (b) the horse affected with equine encephalomyelitis.

—L. LEVENBOOK.

DONOVAN, C. R., & BOWMAN, M. (1942.) Epidemiology of encephalitis; western equine type, Manitoba, 1941.—*Canad. med. Ass. J.* 46. 525-530. 1274

This report on human encephalitis in Manitoba from 1938-41 deals mainly with an outbreak of 509 cases during 1941, including a concurrent epidemic of 966 cases of poliomyelitis. The latter started earlier and lasted longer. During the four years, serological tests were positive in 83 cases for the western equine virus, in one case for the St. Louis virus and in one case for the Japanese B virus. The cases due to equine virus were distributed widely throughout the Province in the 1941 outbreak and most of them occurred in August; approximately 70% occurred in males. 81% of all cases were in persons 20 years of age or older and there was a case fatality rate of 15.3%. There was no evidence that person to person spread was a factor in dissemination of infection. The disease may be insect-borne and the reservoirs of infection may be various and many.

—R. GWATKIN.

MCGUGAN, A. C. (1942.) Equine encephalomyelitis (western type) in humans in Alberta, 1941.—*Canad. publ. Hlth. J.* 33. 148-151. 1275

The disease is briefly considered in its relation to human beings under the headings of diagnosis and reporting, geographical distribution, seasonal incidence, occupation, age and sex, clinical course and sequelae. The diseases which presented differential difficulties

were typhoid fever, acute anterior poliomyelitis, acute ileo-colitis and influenza. Forty-two cases were reported among human beings; blood samples from 28 were examined for neutralizing antibodies, 20 being positive and eight negative. Blood samples were received from 18 cases not reported as encephalomyelitis, eight being positive. Eight deaths were reported in human beings from encephalomyelitis, but one was due to an intracranial malignancy and three were apparently due to acute ileo-colitis. During 1941 the incidence of the disease in horses was high. In the disease in human beings the picture was confused by a concurrent poliomyelitis outbreak and by a number of severe cases of acute ileo-colitis.—R. GWATKIN.

BOWMAN, M. (1945.) Vaccination of humans against western equine encephalitis virus.—*Canad. J. publ. Hlth.* 36. 199-201. 1276

Cases of E.E. were noted in Manitoba as early as

1932 but it did not appear in epidemic form until 1937, at which time 9% of the horse population was affected, with a case fatality rate of 27%. In 1938 it broke out again and a great many horses were vaccinated with chick-embryo vaccine; this was repeated each spring throughout the Province as it seemed a protection against the disease. In 1941 an epidemic occurred in human beings. There were 521 cases and 68 deaths. Early in June 1942, some 3,000 male persons were given two subcutaneous injections of chick-embryo vaccine (Western virus). Prior to vaccination, tests of 1,013 of these persons revealed that 18.95% had neutralizing antibodies. Six weeks after vaccination, blood was again tested from 206 of the 1,013 persons. Of these, 52.4% had neutralizing antibodies. A repeat of this test on 300 people the following year gave very similar results [see following abst.].—R. GWATKIN.

HEATH, L. M. (1945.) Equine encephalomyelitis: serum neutralizing antibodies in man before and after vaccination.—*Canad. J. publ. Hlth.* 36. 201-205. 1277

Three hundred persons aged 19-64 years were given two injections of chick-embryo vaccine. Nine of the sera examined before vaccination showed neutralizing properties for Western virus. Blood was again taken 63 days after the first vaccinal injection and 51% of these samples neutralized 10 M.L.D. of virus. An increase of 50% in the two doses of vaccine did not in-

crease the percentage of neutralizing sera in those receiving the larger doses. It is suggested that the larger followed by the smaller doses may have been responsible for an increased number of reactions in that group, but the numbers were too small to be conclusive.

—R. GWATKIN.

MILLER, A. W. (1945.) Report on infectious equine encephalomyelitis in the United States in 1944. pp. 4. Washington, D.C.: Bureau of Animal Industry. 4to. Mimeographed. 1278

19,590 cases of E.E. with 4,779 deaths were reported in 1944. The seasonal distribution of the cases is given as 212 from January to May, 15,738 from June to October and 261 in November and December. [It will be noted that this accounts for only 16,211 cases.] The average incidence of the disease in affected areas was 2.9 cases per 1,000 horses and mules, the highest incidence being in the state of Missouri with 7.5 cases per 1,000. No details are given of the incidence of the immunological types of the virus.—W. M. HENDERSON.

LENNETTE, E. H., & FOX, J. P. (1943.) Anticorpos neutralizantes para a amostra leste do virus de encefalomicelite equina em equideos no Brasil. [Neutralizing antibodies for the Eastern strain of equine encephalomyelitis virus in horses and mules in Brazil.]—*Mem. Inst. Osw. Cruz.* 38. 85-92. [English summary.] 1279

A brief review is given of the literature on E.E. in Brazil, with especial reference to its doubtful aetiology in that country. Following an epizootic in 1940-41 sera from 18 affected horses were used in neutralization tests with St. Louis encephalitis virus and the Eastern and Western strains of E.E. virus. None of the sera contained neutralizing antibodies for St. Louis encephalitis virus or Western E.E. virus while 14 sera neutralized the Eastern strain of E.E. virus. Only one of 20 control sera was found to contain antibodies for the Eastern strain.—H. G. ARAMBURU.

SIDDIQI, T. A. (1944.) Immunization against rinderpest by a scarification method.—*Indian J. vet. Sci.* 14. 158-162. 1280

Immunization against rinderpest by the scarification method was found to be preferable to the subcutaneous method on account of its simplicity and the simple apparatus and fewer attendants required. The operation was performed on the inner surface of the ear with a vaccine consisting of equal parts of spleen tissue and distilled water. Reactions were slight or absent and even in the latter case there was immunity. Out of 19 animals tested after one year, immunity was strong in 15, partial in three and absent in one; four out of five animals immunized subcutaneously as controls were strongly immune.—C. SEETHARAMAN.

VANCHESWARAN, S. (1945.) Rinderpest and its control—short résumé of the various methods employed in Madras Presidency.—*Indian vet. J.* 21. 410-414. 1281

The most satisfactory method of immunization against rinderpest was the simultaneous inoculation of goat virus and antiserum. It had the advantage of cheapness and there was no risk of transmitting protozoa, as when bull virus is used. Attempts to fix the virus in goats by hundreds of passages were unsuccessful; severe reactions with a mortality of 5-10% followed inoculation of the virus alone into highly susceptible animals, but a small dose of immune serum given simultaneously modified the reaction. Goat spleen tissue, untreated or treated with glycerol and desiccated spleen did not give encouraging results.—C. S.

*VEECHI-FINZI, G. (1942.) Cistite ulcerativa, febbre catarrale maligna ed ematuria cronica dei bovini.

[Ulcerative cystitis, malignant catarrh and chronic haematuria in cattle.]—*Proflassi.* 15. 77-86. [Abst. from abst. in *Jber. Vet.-Med.* 71. 264-265.] 1282

On premises near Rome, out of 36 cattle one died after showing symptoms of haematuria and 12 others had to be slaughtered. Exhaustive investigations did not reveal the definite nature of the condition, but the symptoms shown by one calf suggested malignant catarrh. Sections of the bladder and kidneys of this animal revealed a subacute, necrotic, hypertrophic inflammation of the bladder and subacute glomerular nephritis. No evidence of leptospiral or bacterial infection could be obtained. After the removal of sheep from the premises, cases of haematuria in cattle ceased. All known causes of bovine haematuria having been excluded it was concluded that the condition was malignant catarrh and that sheep must be accepted as the reservoir host of the malignant catarrh virus.

—U. F. RICHARDSON.

I. VON BACKSTROM, U. (1945.) Ngamiland cattle disease. Preliminary report on a new disease, the etiological agent being probably of an infectious nature.—*J. S. Afr. vet. med. Ass.* 16. 29-35. 1283

II. THOMAS, A. D., & MARÉ, C. v. E. (1945.) Knopvelsiekte.—*Ibid.* 36-43. 1284

I. The author describes a hitherto unknown disease confined to cattle and characterized by lameness, swelling of the legs, skin nodules and a generalized acute lymphadenitis. It is confined to Bechuanaland Protectorate and has spread to all parts of Ngamiland, and the history and epizootology indicate that it is of an infective nature.

The symptoms consist of leg swelling, skin nodules, coronary swelling with skin necrosis and complications, these probably being successive stages of the same condition. The skin nodules are 1-3 cm. in diameter and occur all over the body; they become necrotic and the centre sloughs out, leaving a granulating sore. There is a generalized lymphadenitis. The disease is of considerable economic importance owing to loss of condition and complications. The course extends about 14 days in an uncomplicated case; the morbidity is almost 100% and the mortality may be up to 10%, but is usually less.

II. *Knopvelsiekte* or lumpy skin disease was reported in the Union of S. Africa early in 1945. It is now known to be the same disease as that described by VON BACKSTROM in I as Ngamiland disease. It is an acute febrile, infectious disease, the main lesions affecting the skin, mouth, nostrils, pharynx, larynx, trachea, eyes and lymph nodes. Only cattle are affected and it occurs in animals of all ages. The mode of transmission is not known. The mortality is probably less than 10% but the economic losses are heavy, as a result of loss of milk, severe loss of condition and damage to the skin. The disease was transmitted experimentally to cattle by inoculation of blood and material from skin nodules but sheep and small laboratory animals could not be infected. Bacteriological work yielded negative results; no parasites were seen in the blood or lesions. It is presumed that the disease is caused by a virus.

The condition is a febrile one and is generally characterized by the occurrence of skin lesions; these usually take the form of nodules which may be few in number but are usually very frequent and distributed all over the body: they are up to 3 cm. in diameter, with a central crust which sloughs out leaving a granulating wound. Deep suppurating wounds may occur if there is secondary infection. Oedematous swellings of the limbs or brisket often occur and there is usually a generalized lymphadenitis, some of the nodes being greatly enlarged.

There are photographic reproductions of cases with typical skin lesions and sloughing of the skin. The swelling of the dewlap and legs is also depicted.

—E. M. ROBINSON.

NEITZ, W. O., & RIEMERSCHMID, G. (1944.) The influence of solar radiation on the course of blue-tongue:—*Onderstepoort J. vet. Sci.* 20. 29-56. 1285

Complaints were received that in some cases the use of blue tongue vaccine resulted in alarming symptoms, a prolonged convalescent period and poor wool production as the result of unthriftiness; as these severe reactions were not apparent in stabled sheep, direct solar radiation was suspected to be the detrimental factor.

In experiments carried out at different times of the year on the effect of the vaccine on stabled and unstabled, on shorn and unshorn sheep, and on animals photosensitized with methylene-blue, reactions were much more severe in unstabled sheep and in shorn animals; there was a distinct increase in severity in photosensitized animals, in which broncho-pneumonia occurred on several occasions.

During the course of the investigations multiple haemorrhages and muscular degeneration were observed in both stabled and exposed sheep. This observation is thought to explain the general weakness, torticollis and stiffness of sheep reacting to blue tongue; the general unthriftiness which sometimes occurs after vaccination may be attributable to the muscular degeneration.—U. F. RICHARDSON.

NOVICKY, R. (1944.) La vacuna al cristal violeta para la prevención del cólera porcino en Venezuela. [Crystal-violet vaccine for the prevention of swine fever in Venezuela.]—*Bol. Inst. Invest. vet., Caracas* 2. 225-291. [English summary.] 1286

An attempt to control the spread of swine fever prevalent in the coastal districts of Venezuela by the use of crystal violet vaccines prepared with local strains of virus proved unsatisfactory. A strain of virus obtained from the U.S.A. proved more virulent than the Venezuelan strains and was superior antigenically. Detailed results of protection tests are given.—H. G. A.

RIFKIN, H., CEKADA, E. B., ZARROW, M., HENDERSON, D. G., & WHITEHEAD, J. O. (1945.) The diagnostic significance of inclusion bodies in rabies and canine distemper.—*J. Lab. clin. Med.* 30. 748-751. 1287

On an island in the South Pacific rabies had never been known to occur but distemper in dogs was common. Two dogs belonging to a service unit became excitable and vicious, developed convulsions and bit six soldiers. Rabies was suspected and the animals were destroyed. In one, there was congestion of the meninges and brain substance together with haemorrhagic consolidation of the lungs. Smear preparations from the brain stained by the methods of Mann and Seller showed inclusion bodies in the cytoplasm of cells in the cortex, medulla and hippocampus. These stained a pinky red colour with Mann's stain and had clear vacuolated-like bodies in the interior but no central basophilic chromatin granules were visible. The inclusion bodies were believed to be Negri bodies and rabies was diagnosed. The brain of the other dog showed similar inclusion bodies. A g. pig, a mouse and a rabbit were inoculated intracerebrally with emulsion of brain tissue: none of them developed rabies.

Four other dogs with characteristic symptoms of distemper with nervous complications were examined P.M. Lesions suggestive of distemper were present in the lungs. The meninges were congested and the brain substance oedematous and haemorrhagic. Inclusion

bodies identical with those in the two dogs suspected of rabies were present. Scanty inclusion bodies were seen in smears made from the bronchial, tracheal and vesical mucous membranes. Intracerebral inoculations of g. pigs, rabbits and mice were negative for rabies.

The authors conclude that they were dealing not with rabies but with distemper or distemper complicated by an encephalitis; they stress the similarity in symptoms, P.M. findings and microscopic changes which makes differential diagnosis difficult.—M. C.

GREEN, R. G. (1945.) Control of distemper in foxes.—*Amer. Fur. Breed.* 17. No. 12. 14, 16, 18 & 20. 1288

This semi-popular article describes fox distemper and the successful results obtained in commercial fox farms by the use of distemperoid vaccine. [This is a live vaccine consisting of a ferret-adapted strain of distemper virus which is of such low virulence for foxes that it may be used for immunization without simultaneous use of serum or prior use of vaccine—see *V. B.* 16. 100.] A single injection of the ferret-adapted virus is stated to give a lasting immunity to silver, red and blue foxes but is said to be too virulent for use on mink. Little or no reaction occurs in foxes save in some few individuals belonging to highly inbred strains. Immunity, it is claimed, is developed very rapidly; fox pups may be vaccinated when two months old. Spread of infection from vaccinated to unvaccinated foxes and from vaccinated foxes to mink kept on the same farm has not been observed. When unweaned pups are to be immunized a dose of distemper antiserum is given with the distemperoid virus. This is followed 3-4 weeks later by an injection of distemperoid virus alone. The distemperoid vaccine has been used on contacts during an actual outbreak of the disease and it is claimed that under such circumstances a single injection is sufficient to control an outbreak.

It is recommended that foxes which are being immunized should be protected by quarantine for a period of 60 days after inoculation. [This seems to be somewhat at variance with the claim that "immunity to distemper is established very rapidly after injection of the distemperoid vaccine".]—M. C.

GREEN, R. G. (1946.) Quick protection and therapeutic effect of distemperoid virus.—*N. Amer. Vet.* 27. 165-168. 1289

G. reports experiments in which foxes given intranasal instillations of virulent distemper virus resisted infection if intramuscular injection of a large dose of distemperoid virus [see preceding abst.] was given simultaneously. G. also reports that intramuscular injections of distemperoid virus had a curative effect if given during the first 7-10 days of a distemper infection initiated by intranasal instillation of virulent distemper virus. The therapeutic effect was somewhat less marked when the infecting dose of virulent virus was given intramuscularly.

The quick protection and the therapeutic effect are different from the ordinary immunization process dependent on the development of antibodies, and G. considers that it is an example of the interference or cell-blockage phenomenon, described in 1935 independently by HOSKINS and MAGASSI and later confirmed by FINDLAY & MACCALLUM [*V. B.* 8. 105], DALLDORF, DOUGLASS & ROBINSON [*V. B.* 8. 509], JUNGBLUT & SANDERS [*V. B.* 13. 124] and ANDREWS [*V. B.* 15. 295]. This phenomenon consists in the protection conferred upon an animal against a virulent virus by a prior or simultaneous injection of a related or, in some cases, unrelated virus. It has also been demonstrated with bacteria and bacteriophages. The suggested

explanation is that the viruses, obligatory parasites of tissue cells, form a combination with the invaded host cell and that once such a combination has occurred the host cell is "blocked" and cannot be invaded by another related virus. G. suggests that following infection with distemper virus by intranasal instillation, and probably also following natural infection, the virulent distemper virus at first spreads slowly through the mass of tissue cells of the infected fox or dog. The large dose of distemperoid virus administered by the intramuscular route, which favours rapid absorption, invades and saturates the tissue cells not yet attacked by the distemper virus. This hypothesis explains both the rapidity with which the inoculated animal is protected and the fact that inoculation has a therapeutic effect in the early stages of an already established infection.

[The importance will be realized of these findings, if confirmed, in the control of distemper. The rapidity of protection and the economy effected by the fact that neither serum nor formolized vaccine are necessary are great advantages over existing methods of immunization. It is of interest to note that similar claims have been made by PFAFF in respect of the goat-adapted strain of rinderpest virus in the immunization of cattle against rinderpest (see *V. B.* 9. 623 and 10. 758).]

—M. C.

LINHARES, H., & FORTES, A. B. (1944.) Mielencefalite espontânea dos camundongos. [Spontaneous encephalomyelitis (Theiler's virus) in mice in Brazil.]—*Mem. Inst. Osw. Cruz.* 40. 47-85. [English summary.] 1290

A comprehensive report is given of the isolation at the Oswaldo Cruz Institute of a neurotropic virus from spontaneously infected white Swiss mice. This virus appears to be identical with that described by THEILER [*V. B.* 7. 602].—H. G. ARAMBURU.

BELLER, K. (1943.) Eine neue Virusseuche beim Haushuhn. [A new virus disease of poultry.]—*Dtsch. tierärztl. Wschr. [Tierärztl. Rdsch.]* 51/49. 263-264. 1291

Investigation of a few outbreaks of disease among young chicks in hatcheries in Germany during the summer of 1943 resulted in the isolation of a filterable virus from tissue suspensions of affected birds. When inoculated experimentally into young chicks, this virus produced after an incubation period of 3-4 days an acute, fatal disease rarely lasting more than one day; adult birds were not susceptible. The most frequent finding P.M. was a fibrinous pericarditis and a fibrinous peritonitis of the liver. Cross-immunity tests showed no relationship to classical fowl plague (Rostock strain) or an atypical form of fowl plague (Vianello strain). B. considers that the virus can be differentiated from fowl plague virus on epidemiological, pathological and immunological grounds. In recent years a similar disease was diagnosed as "fowl plague"; the importance is stressed of using young chicks for isolation of this new virus.—W. M. HENDERSON.

LAEMMERT, H. W., Jr., & DE CASTRO FERREIRA, L. (1945.) The isolation of yellow fever virus from wild-caught marmosets.—*Amer. J. trop. Med.* 25. 231-232. 1292

The first successful isolation of the yellow fever virus from a naturally infected vertebrate other than man is recorded. 1,437 wild marmosets (*Calithrix penicillata*) were captured or purchased from local trappers in a district in the State of Bahia where the disease is endemic. A significant number of these were shown by neutralization tests to have yellow fever antibodies in their sera. From four marmosets which were weak

and apparently ill at the time of capture and died shortly afterwards the virus was isolated by inoculating mice intracerebrally with liver emulsions; although the investigations were continued for more than a year the four infected marmosets were all captured in a period between 7th June and 13th August and all in the same locality.—M. C.

LINHARES, H. (1943.) Inoculação de virus amarello em gatos jovens. [Inoculation of kittens with yellow fever virus.]—*Mem. Inst. Osw. Cruz.* 38. 201-207. [English summary.] 1293

Domestic cats 1-4 months old were used in experiments to determine the susceptibility of members of the family Felidae to yellow fever virus. A viscerotropic strain from a rhesus monkey and a neurotropic strain from mice were used for intracerebral and intraperitoneal inoculation. No virus could be recovered up to 12 days after inoculation, and no symptoms developed referable to the virus. Histological examination of the brains of seven cats that died showed no lesions, but neutralizing antibodies were detectable in 14 out of 16 cats inoculated with neurotropic virus and in two out of 11 cats inoculated with viscerotropic virus.—H. G. A.

DINGLE, J. H. (1945.) The present status of the etiology of primary atypical pneumonia. Commission on acute respiratory diseases.—*Bull. N.Y. Acad. Med.* 21. 235-262. 1294

An investigation by a U.S. Army Commission during the past three years showed that psittacosis or ornithosis has occurred in only 500 cases of atypical pneumonia and other respiratory infections. There was no evidence that various agents isolated by different workers were responsible for more than a very small proportion of cases.

D. and his associates consider that the disease is probably communicable from man to man and may be caused by a virus. Two series of experiments were carried out in human volunteers with equivocal results. In the third test, however, in which there were 32 volunteers divided into three groups, the results were more promising. In the first group (12) which received unfiltered sputa and throat washings administered into the nose and throat in the form of a spray, there were three definite and five minor cases of a respiratory illness which may have been atypical pneumonia; in the second group (12) receiving a Seitz filtrate, there were three frank and five suspected cases. In the third group (18) which received autoclaved material, there were no cases of atypical pneumonia and only one of a minor respiratory infection.—R. E. GLOVER.

MACCALLUM, F. O., & MILES, J. A. R. (1946.) A transmissible disease in rats inoculated with material from cases of infective hepatitis.—*Lancet.* 250. 3-5. 1295

Wistar strain white rats kept for at least seven days before and during the experiment on a diet deficient in some essential amino acids were used for the attempted transmission of infective hepatitis by the intraperitoneal injection of blood and the oral administration of faeces from a human case. Passage was continued by oral and/or intraperitoneal inoculation of pooled suspensions or filtrates of liver, spleen and kidney from rats killed on the 16th-21st day or dead on the 12th-21st day. By the third passage a condition was established producing necrosis of the liver, enlargement and/or haemorrhage of the lymph nodes, haemorrhage in the stomach and/or intestines and haemorrhages in the lungs. No such condition was produced by passage in rats on the same diet starting with normal human serum and faeces.

The special diet consisted of a mixture containing 16% dried brewers' yeast, 4% casein, 71% maize starch, 1% cod liver oil, 5% arachis oil and 3% salt mixture; plus a vitamin supplement to supply each rat daily with 20 µg. thiamine hydrochloride, 25 µg. riboflavin, 20 µg. pyridoxine and 120 µg. calcium pantothenate.—W. M. HENDERSON.

VIOLLIER, G. (1942.) Die Histologie der experimentellen Fleckfieberpneumonie weisser Mäuse. [The histology of rickettsia pneumonia in the white mouse.]—*Schweiz. Z. Path. Bakt.* 5. 360-374. [English, French & Italian summaries.] [English summary copied verbatim.] 1296

The lung lesions of mice nasally inoculated with murine typhus are described. The rickettsia are first taken up by the alveolar epithelial cells where they multiply enormously. After the bursting of these cells the liberated rickettsia invade the epithelial lining of the small bronchi where enormous multiplication occurs. The liberation of the rickettsia from the bursting cells causes an acute inflammatory response. The rickettsia are taken up by polynuclear leucocytes which in turn rapidly degenerate. The debris of the destroyed

epithelial cells and the leucocytes are taken up by macrophages which invade the lumina of the alveoli, the small bronchi and the surrounding tissue. In lungs of mice which have recovered no lesions were found except some circumscribed collections of lymphocytes.

TOPPING, N. H. (1945.) Tsutsugamushi disease (scrub typhus). The effects of an immune rabbit serum in experimentally infected mice.—*Publ. Hlth Rep., Wash.* 60. 1215-1220. 1297

In view of the claim that the early administration of immune rabbit serum is of value as a therapeutic agent in the treatment of rickettsial infections, notably Rocky Mountain spotted fever, its action was tested on mice infected with tsutsugamushi disease.

Rabbits were immunized by courses of intravenous injections of yolk-sac material infected with a tsutsugamushi strain, several of the rabbits receiving a second course of injections after a period of rest. The results indicated that death in infected mice could be prevented when treated with serum after a lapse of 72-168 hours from the time of infection. The antibody titre of rabbit immune serum appeared to be increased by the second series of injections with yolk-sac material.—U. F. R.

See also absts. 1335, 1336 (rabbit myxoma), 1341 (foot and mouth disease), 1433 (equine encephalomyelitis), 1434 (dog distemper), 1435 (variola-vaccine virus), 1473 ('w'ah' of goats in India).

IMMUNITY

EVANS, D. G. (1945.) The treatment with antitoxin of experimental gas gangrene produced in guinea-pigs by (a) *Cl. welchii*, (b) *Cl. oedematiens* and (c) *Cl. septicum*.—*Brit. J. exp. Path.* 26. 104-111. 1298

The efficacy of each of the British standard antitoxins for the three main gas-gangrene organisms, was tested under varying conditions in g. pigs injected with 1,000 fatal doses. In each of the three infections antitoxin was successfully provided a sufficient dose was given sufficiently early. The θ antihemolysin content of the *Clostridium welchii* antitoxin was relatively small compared with its α value.

Because of the arbitrary nature of the antitoxic units it was not possible to decide whether one specific antitoxin was more efficacious than the others, but it was postulated that success in each case depends on there being sufficient circulating antitoxin to neutralize the toxin elaborated by the proliferating infection. The interval of time between infection and intravenous antitoxin therapy was shown to be very important. Thus antitoxin administered relatively early gave complete protection even when clinical symptoms were advanced, whereas large doses given later (e.g., after 16-24 hours) had no curative value. It was noted, however, that such delayed treatment produced clinical improvement and prolonged life considerably.—J. KEPPIE.

See also absts. 1229 (immunization against John's disease), 1261 (against viruses), 1262 (against foot and mouth disease), 1264, 1265 (against rabies), 1266 (against fowl pox), 1276, 1277 (against E.E.), 1236 (antigenic structure of *S. pullorum* variant), 1237 (brucella allergy), 1252 (immune reactions in Chagas' disease), 1260 (immunology of virus diseases), 1297 (serum treatment of tsutsugamushi disease), 1280, 1281 (against rinderpest), 1285 (against blue tongue), 1286 (against swine fever), 1288, 1289 (against distemper in foxes), 1314 (serodiagnosis of cysticercosis), 1316, 1317 (of trichinosis), 1315 (allergic diagnosis of coenurosis), 1318 (trichina antigens).

PARASITES IN RELATION TO DISEASE [GENERAL]

TAYLOR, E. L. (1944.) The trend of British veterinary parasitology.—*Endeavour*. 3. 150-155. 1300

T. points out that the parasites of domesticated animals in Great Britain which are of most economic importance are the helminths, and that the story of parasitic disease in Britain largely centres on the derangement of the ecological balance between the worms and their hosts. This derangement has been brought about by a variety of agricultural developments,

of which pasture development and increased concentration of stock are the chief. The growth of parasitology in all its branches started with studies of the morphology and classification of parasites, followed by investigations of their life-histories and studies of their association with disease. The most useful work of the morphologist and taxonomist, as far as parasites of veterinary interest are concerned, is now complete; so also is much of the work on the outlines of life-histories. T. divides

parasitology into "normal" and "pathological" and considers that the general trend of helminthological investigation is towards epidemiology and that the field of investigation for the immediate future will probably be that of chemotherapy. When the rationale of anthelmintic action is better understood, T. thinks that it will be possible to apply chemotherapeutic methods to full advantage and that these methods will have the same success as has been obtained in other branches of medicine; a firmer control than is as yet practicable will thus be established over the parasites, the eradication of which, at present, seems to be out of the question.

—J. N. OLDHAM.

SCHWARTZ, B. (1945.) Zooparasites in relation to production of meat and other animal products in wartime.—*J. Amer. vet. med. Ass.* 106. 331-335. 1301

S. reviews some of the serious obstacles to livestock production from uncontrolled infestation with animal parasites, as a result of which considerable losses of food,

hides, fibre etc., may occur. Rotenone as a destructive agent for ectoparasites and phenothiazine as an anthelmintic for endoparasites are both very useful, while liver-fluke infestations can be treated with hexachlor-ethane. In addition to the destruction of animal parasites by these drugs, measures for the prevention of infestation or reinfestation must also be carried out or devised.—J. N. OLDHAM.

ECHAVARRÍA, A. C. (1942.) Parásitos de los animales domésticos. [Parasites of domestic animals.]—*Rev. Fac. nac. Agron. (Colombia)*. 5. 233-295. [Abst. in *Rev. appl. Ent. Ser. B.* 33. 148, copied verbatim.] 1302

This is an annotated list of some organisms that attack domestic animals in Costa Rica. They are arranged systematically under their hosts (cattle, horses, pigs and birds) and include some insects and parasites transmitted by insects. The notes include information on morphology, life-history and remedial treatments.

PARASITES IN RELATION TO DISEASE [ARTHROPODS]

BOERO, J. J. (1944.) Breve nota sobre Ornithocoris toledo, Pinto 1927. Chinche de las gallinas. (Hemiptera-Cimicidae). [Brief note on the chicken bug, *O. toledo*.]—*Bol. tec. Direc. gen. Ganad., B. Aires*. No. 10. pp. 679-680. [See also *V. B.* 15. 82, abstr. 527.] 1303

B. gives a brief biological note on the chicken bug, *Ornithocoris toledo*, with reference to its life-cycle and medical significance, pointing out that the bugs can feed on human beings and may become carriers of disease. There are four drawings of the parasite.

—H. G. ARAMBURU.

OTTE, W. (1943.) Die Kriebelmücke und Simuliidenkrankheit im Wartheland. [Plagues of Simuliidae in Wartheland, Poland.]—*Berl. Münch. tierärztl. Wschr./Wien. tierärztl. Mschr.* July 9th. 218-222. 1304

A general account of the life-history of Simuliidae is given. Early June is the worst period of the year for midges to cause trouble to horses and cattle. The flies feed on the bare portions of the head and neck, and swellings develop over the surface. In severe cases, horses show marked debilitation and death may occur. Infected animals can be treated with subcutaneous injections of a solution of 7 parts of caffeine with sodium benzoate in 15 parts distilled water, or with a mixture containing 5 parts each of camphor and ether, 10 parts of olive oil. The swellings should be treated with iodine and glycerin and if they persist they should be removed by surgical treatment. Repellent dressings of naphthalene in oil are a valuable preventive.—J. B. C.

HOHORST, W. (1943.) Die Zecke Dermacentor marginatus Sulzer 1776, ihre Verbreitung, Lebensweise und medizinische Bedeutung. [Dermacentor marginatus, its distribution, life-history, and medical importance.]—*Z. Parasitenk.* 13. 118-146. 1305

A description is given of the morphological characteristics of the adults, eggs, larvae and nymphs of *D. marginatus*, its distribution, feeding habits, and its importance in the production of disease. The tick has a wide distribution in Europe and has been recorded in Great Britain from Devonshire and Wales, but is most prevalent in eastern Germany and Russia; it is particularly prevalent in swampy areas. The adults appear immediately after the snow melts, and feed on sheep, horses, cattle and dogs; they even attack man. They disappear in May and June, but adults of the

next generation may appear in the late autumn. The winter period is passed in the adult stage, but feeding does not usually commence until the early spring. The larvae normally feed on small mammals, but will feed on horses and dogs; the g. pig is particularly suitable as a laboratory host for them. The nymphs also feed on small mammals, but have been found on horses, dogs and cattle; rabbits and hedgehogs are particularly suitable as laboratory hosts, the nymphs tending to cluster round the eyes and ears.

Rabbits used for feeding larvae and nymphs develop a severe anaemia, whilst in infested sheep there is local necrosis of the parts attacked (head, neck and shoulders) and a loss of wool. In horses these ticks transmit *Babesia caballi*, and it is known that the infection acquired by the larvae will persist through the nymph to the adult stage. Infection with *B. canis* from dogs will pass through the egg and is not transmitted till the next adult stage.—U. F. RICHARDSON.

ZUMPT, F. (1943.) Rhipicephalus aurantiacus Neumann und ähnliche Arten. VIII. Vorstudie zu einer Revision der Gattung Rhipicephalus Koch. [Studies preliminary to a revision of the genus Rhipicephalus. VIII. *R. aurantiacus* and similar species.]—*Z. Parasitenk.* 13. 102-117. [For part VII, see *V. B.* 15. 83, abstr. 532. For previous parts, see *V. B.* 13. 131.] 1306

The ticks dealt with in this paper are characterized by the punctuation of the scutum, which is similar to that of *R. capensis*, and by the absence of marginal furrows, but are not a homogeneous group, as *R. mähleri* is a member of the *appendiculatus* group whilst the other species considered belong to the *capensis* group.

The species are described, illustrations of them are given and their distribution is discussed. *R. mähleri* n.sp., *R. aurantiacus* Neumann, 1907, *R. ziemanni* Neumann, 1904, *R. masseyi* Nuttall and Warburton, 1908, and *R. jeanneli* Neumann, 1913 are accepted as authentic species, whilst *R. cuneatus* Neumann, 1908 is considered as a synonym of *R. ziemanni*, and *R. kochi* Dönitz, 1905, as probably identical with *R. jeanneli*, although a doubt occurs owing to a difference of distribution and to the few specimens available for comparison. If these species are identical, the name *R. kochi* has priority.—U. F. RICHARDSON.

RISBEC, J. (1944.) Un parasite des tiques du chien. [An Encyrtid parasite of dog ticks (*Habrolepis* sp.).]

—Notes afr. No. 22. pp. 3-4. [Abst. in Rev. appl. Ent. Ser. B. 33. 92, copied verbatim.] 1307

A brief description is given of an Encyrtid of the genus *Habrolepis* that has been found parasitising *Rhipicephalus sanguineus*, Latr., on dogs in French West Africa. The female oviposits in young ticks on the host, and the larvae feed on the eggs in the tick, which dies, and pupate in its abdomen. A dozen Encyrtids can develop in one tick.

ARCHER, A. F. (1944.) The ticks of central Tennessee.—*J. Ala. Acad. Sci.* 16. 25. [Abst. in Rev. appl. Ent. Ser. B. 33. 23, copied verbatim.] 1308

Records are given of the local distribution of the ticks found by the author in central Tennessee in 1943. They comprised *Amblyomma americanum*, L., on man, cattle, dogs and sheep, *Dermacentor variabilis*, Say, on man and dogs, *Haemaphysalis leporis-palustris*, Pack., on rabbits and *Argas persicus*, Oken, which was found under loose bark of trees used by roosting fowls. Rocky Mountain spotted fever and tularaemia have recently become of some importance in central Tennessee, and *Amblyomma americanum* is the species chiefly responsible for their transmission there. It represented 90 per cent. of all the ticks found by the author, though *D. variabilis* was more widely distributed.

I. OSORNO MESA, E. (1942.) Las garrapatas de la República de Colombia. [The ticks of the Republic of Colombia.]—*Rev. Fac. nac. Agron. (Colombia)*. 5. 57-103. 1309

See also absts. 1224 (vectors of anthrax), 1230 (of rat leprosy), 1232 (of tularaemia), 1255 (of equine piroplasmosis), 1324 (of canine filariasis), 1335 (of rabbit myxoma), 1401, 1402, 1436 (insecticides).

PARASITES IN RELATION TO DISEASE [HELMINTHS]

BHALERAO, G. D., & RAO, N. S. (1944.) Some helminth parasites of poultry.—*Proc. Indian Acad. Sci. Sect. B.* 20. 30-39. 1312

Tetrameres mohtedai n. sp. and *Bhalifilaria badamti* n.g., n. sp., obtained from proventriculus and heart respectively of fowls, are described. Certain observations are made on the morphology of *Acuaria hamulosa*, *Capillaria columbae*, *Railletina rangoonica*, *R. tetragona* and *Cotugnia diagonopora*. *Acuaria spiralis* and *Hymenolepis cantianiana* are recorded from Indian fowls. *Acuaria pavonis* and *Railletina grobbeni* are recorded as synonyms of *A. hamulosa* and *R. echinobothrida* respectively. *Heterakis beramporia* and *R. echinobothrida* are recorded from fowls in Singapore.—H. D. SRIVASTAVA.

MALDONADO, J. F. (1945.) The life cycle of *Tamerlania bragai*, Santos 1934 (Eucotylidae), a kidney fluke of domestic pigeons.—*J. Parasit.* 31. 306-314. 1313

The life-history is described of *T. bragai*, a fluke found in the urinary passages of the pigeon. The intermediate host is the snail *Subulina octona*. Pigeons are infected by the ingestion of infected snails containing encysted cercariae. Excystation of the cercariae takes place in the duodenum and the metacercariae move down to the cloaca and thence to the kidney via the ureters. The fluke becomes sexually mature at the end of the second week. The larval cycle occupies one month.—T. E. GIBSON.

*GAERTGENS, W. (1941.) Beitrag zur Serodiagnose der Zystizerkose. [The serological diagnosis of cysticercosis.]—*Münch. med. Wschr.* 88. 1235 & 1238. [Abst. from abst. in *Wien. tierärztl. Mschr.* 30. 27-28.] 1314

The production of a *Cysticercus* antigen is described and results obtained in the testing of blood serum and body fluids are communicated. It is concluded that the

II. FRANCO, F. R. (1942.) Informe sobre el trabajo "Las garrapatas de la República de Colombia. [Discussion on the above paper.]—*Ibid.* 104-110. 1310
[Absts. in Rev. appl. Ent. Ser. B. 33. 54, copied verbatim.]

The first of these papers has been noticed from another source [*V. B.* 13. 322]. In the second, the actual and possible relation of ticks to disease in man and animals in Colombia and elsewhere is discussed. The tick-borne diseases occurring in Colombia are relapsing fever transmitted by *Ornithodoros rudis*, Karsch, spotted fever, and piroplasmosis of cattle, caused by *Piroplasma bigeminum*, which has been found by the author in various parts of the country.

SAUNDERS, T. S. (1944.) Dermatitis from Tyroglyphidae in handlers of straw.—*Arch. Derm., Chicago*. 50. 245. [Abst. in *Bull. Hyg., Lond.* 20. 269-270, copied verbatim. Signed: J. F. CORSON.] 1311

Two cases of dermatitis caused by mites of the Family Tyroglyphidae are described. The men contracted the disease by handling straw used for packing; the mites were found in the straw and identified by entomologists. One man had intense itching and an eruption on the face and forearms, consisting at the time of examination of "excoriated urticarial papules"; the other man had a blotchy erythema on the face and "lichenified erythematous excoriated papules" on the front of the wrists. Both recovered when they ceased to handle the straw.

serological investigation of serum and body fluids by means of the complement-fixation and precipitation tests may furnish valuable results in the diagnosis of manifest cysticercosis if the dose of antigen is carefully adjusted and the specificity is kept high.—D. G. G.

RONZHINA, G. I. (1940.) Allergicheskaya reaktsiya kak metod diagnostiki tsenuroza u ovets. [Allergic reaction for diagnosis of coenurosis in sheep.]—*Rabot. XIII Plen. vet. Sekts. Akad. sel'khoz. Nauk, Moscow, 1939. [Collected Works.]* pp. 236-240. 1315

From a variety of methods tried for the preparation of an allergen for the diagnosis of coenurosis and cysticercosis in sheep, the technique finally chosen was to use an emulsion of scolices, or the fluid contained in the coenurus, the intradermal palpebral test being used. A positive reaction in an infested host takes the form of severe inflammation of the skin at the site of injection.

To differentiate between infestations with the two types of cyst, R. recommends the use of allergens prepared from both of these consecutively when, according to the degree of swelling obtained, the correct diagnosis may be made with a fair degree of certainty. In this connexion it is pointed out that coenurus is most frequently found in animals one and two years old, the age at which they are chiefly infested by cysticerci.

—L. LEVENBOOK.

*SCHULZ, W. (1941.) Versuche über den serologischen Nachweis der Trichinose und ihre klinische Bedeutung. [The serological diagnosis of trichinosis.]—*Münch. med. Wschr.* 88. 1085-1087. [Abst. from abst. in *Wien. tierärztl. Mschr.* 30. 26-27.] 1316

S. states that eosinophilia may be absent as a clinical sign if there is a concurrent mixed bacterial infection. The complement-fixation reaction and the precipitation reaction are also not very useful, contrary

to the experience of some authors found that an intradermal reaction gave satisfactory results. Patients were injected intracutaneously on the inner side of the under-arm with a 1:5,000 dilution of a commercial trichina antigen (1:1,000 and 1:10,000 dilutions also gave positive reactions). Readings were taken after 15, 30, and 60 min., an erythema of at least 1.5 cm. diameter being taken as positive, while one of less than 1 cm. diameter was taken as negative. The test was always negative in patients who had never been infected, while infected patients always showed a positive reaction during the first months even if trichinosis could not be distinguished clinically. There was a certain parallelism between the intensity of the intracutaneous reaction and the degree of the original eosinophilia.

Attempts to demonstrate the calcified cysts in the muscles *in situ* by X-ray examination were unsuccessful as the rays penetrated the capsules.—D. G. GILMOUR.

*GAASE, A. (1941.) *Ergänzende Mitteilungen zur serologischen Diagnose der Trichinose. [Serological diagnosis of trichinosis.]—Münch. med. Wschr.* 88. 1183. [Abst. from abst. in *Wien. tierärztl. Mschr.* 30. 27.] 1317

Experiments are reported on the duration of the antibody effects in trichinosis as shown by the complement-fixation and precipitation reactions. The serological and clinical findings did not always agree. Thus in typical clinical trichinosis, with high temperature, oedema of the eyelids, myocardial defects and lymphocytosis, the c.-f. reaction was negative, while in other cases without clinical symptoms it was positive or strongly positive.—D. G. GILMOUR.

MELCHER, L. R. (1943.) *An antigenic analysis of Trichinella spiralis.*—*J. infect. Dis.* 78. 31-39. 1318

Larvae obtained by peptic digestion from the muscles of two experimentally infected pigs were collected and repeatedly washed until free from protein; they were then rapidly frozen at -72°C . and stored in the frozen state until required. When all the larvae had been thus treated they were dried in the frozen state ("lyophilized"). It is claimed that this prevented autolytic changes, imparted a porosity which facilitated extraction with lipid solvents and rendered proteins less subject to denaturation. The lyophilized larval material was fractionated by appropriate procedures, for details of which the original paper should be consulted. Six fractions were obtained:—(1) polysaccharide, (2) lipoids, (3) defatted, insoluble residue of pH 8.3, (4) alkaline extract, (5) acid-insoluble protein, and (6) acid-soluble protein.

In the immunological tests, rabbits previously found negative to precipitin tests were each experimentally infected by stomach tube with 10,000 larvae obtained from rats. One month later the rabbits' sera were tested for precipitins with all the fractions except numbers (2) and (3) which were insoluble in saline. The acid-insoluble protein gave no reaction, while the acid-soluble protein gave powerful reactions at titres up to 1:512,000 and the polysaccharide and alkaline extract rather less powerful reactions. Skin tests were made on the same rabbits with all six fractions, the defatted insoluble residue being used as a suspension and the lipid as an emulsion in saline. Only the alkaline extract and the acid-soluble protein gave positive reactions, at dilutions up to 1:1,000 and 1:50,000 respectively. Further rabbits were immunized separately with six intravenous injections on alternate days of 5 mg. of the polysaccharide, alkaline extract, and acid-soluble protein fractions of *T. spiralis*, and of an alkaline extract of lyophilized adult swine ascaris. The four types of antisera obtained were pre-

cipitin tested with the four types of antigen. All the four antigens produced homologous antisera, but there was no cross-reaction between the *Ascaris* antigen and the *Trichinella* antisera or vice versa. The acid-soluble protein gave the most powerful homologous antiserum, and reacted strongly with the antiserum to the whole worm extract. The polysaccharide also produced a powerful homologous antiserum, but reacted only weakly with the antiserum to the whole worm extract. Similarly the whole worm extract reacted weakly with the polysaccharide antiserum. It is suggested that normally the polysaccharide is associated with the protein (since the protein fraction gave a positive Molisch reaction at all stages), and is masked by it serologically.

Electrophoretic analysis of the acid-soluble protein showed the presence of three components.—D. G. G. HAMANN, C. B. (1943.)

Estimation of histamine in the blood and other tissues of rats and guinea pigs infected with Trichinella spiralis.—*J. Parasit.* 29. 367-372. 1319

The purpose of this investigation was to determine the role of histamine in the toxicology of trichinosis, since histamine is considered to be one of the products of tissue destruction. Infections were set up in rats by feeding ground infected muscle (about 6,000 larvae per rat) and in g. pigs by administering by stomach tube larvae obtained by artificial digestion (about 3,000 larvae per g. pig). As far as possible litter mates were used as uninfected control animals. The diaphragms of the animals were examined microscopically for infection, 16-18 days after administration of larvae for rats, and 23-26 days after for g. pigs. The histamine was then extracted by various methods, from blood, lung, liver, intestine, skeletal muscle and kidney tissue and assayed by its effect on isolated segments of g. pig ileum from animals starved for 24 hours.

A wide variation between individuals in histamine values of blood was found in both the experimental and the control groups, but the mean for infected rats (1.4 μg . per ml.) was significantly greater than the mean for the control rats (0.5 μg . per ml.), and for the infected g. pigs (1.5 μg . per ml.) was significantly greater than for the control g. pigs (0.7 μg . per ml.). No such difference was found for tissues other than blood, except that the few infected g. pigs showing duodenal inflammation had very much higher values for intestinal histamine than had the controls.—D. G. GILMOUR.

DEADMAN, W. J. (1941.) *Report of an outbreak of trichinosis.*—*Canad. publ. Hlth J.* 32. 513-517. 1320

In November 1940 an outbreak of trichinosis occurred in Hamilton, Ontario. Twenty-three cases were diagnosed. Three persons were detained in hospital but there were no fatalities. The source in all instances was sausage from the same dealer. The pork was traced to two primary producers, one of whom had a case of trichinosis in his own family.—P. J. G. P.

KUITUNEN-EKBAUM, E. (1941.) *The incidence of trichinosis in humans in Toronto. Findings in 420 autopsies.*—*Canad. publ. Hlth J.* 32. 569-573. 1321

During the years 1939 and 1940, 420 diaphragms from adults and children were examined for *Trichinella spiralis* in Toronto. The examination was made by both the Baermann-digestion method and the direct microscopic examination of compressed muscle. Of the 420 diaphragms examined, seven were infected with *T. spiralis*, six being from adults and one from a 7-month-old foetus.—P. J. G. PLUMMER.

LASER, H. (1944.) *The oxidative metabolism of Ascaris suis.*—*Biochem. J.* 38. 333-338. 1322

The oxygen uptake and, in some cases, the carbon

dioxide output of whole worms or muscle pulp, were measured in open-type Warburg manometers at 39°C. When different substrates were added to the medium, the worms were injected with a quantity of substrate dissolved in body fluid sufficient to produce an internal concentration equal to that in the outside medium. It was concluded that aerobiosis occurs normally in the intestine of the host, but at a low level. Prolonged anaerobiosis produced an oxygen debt, but on the other hand the O_2 uptake increased with rising O_2 tension, accompanied by the formation of hydrogen peroxide which was not rapidly decomposed owing to the very low concentration of catalase. In an atmosphere of pure O_2 , the worms died fairly quickly; the cause of death was assumed to be the hydrogen peroxide formed. Findings believed to show adaptation of the enzyme system to the low level of oxidative metabolism were the low concentration of cytochrome in spite of the presence of succinic dehydrogenase, and the apparent inability of the worm to deal with accumulated oxaloacetic acid, which decreases the activity of succinic dehydrogenase.—D. G. GILMOUR.

MOHAN, R. N. (1945.) Hump-sore and its treatment. —*Indian Fmg.* 6. 55-56. 1323

In the plains of north-east India, 50-90% of adult cattle during summer and monsoon have sores about the hump caused by *Stephanofilaria assamensis*. M. gives a résumé of existing knowledge of the condition.

—M. A. KHAN.

— (1945.) Report of special committee on canine filariasis. Illinois State Veterinary Medical Association.—*N. Amer. Vet.* 26. 674-676. 1324

Contrary to general opinion, canine filariasis occurs in the northern, as well as the southern states of the U.S.A. Replies to a questionnaire returned by veterinarians in Illinois showed a direct blood smear to be the usual method of diagnosis, and the committee points out that examination of a drop of serum from suspected dogs would reveal more cases. Negative results may be due to examinations being made at an unsuitable time of the day. Known vectors of *Dirofilaria immitis* are mosquitoes of the genera *Anopheles*, *Aedes*, *Myzozhynchus*, and *Culex*, and the fleas *Ctenocephalus canis*,

C. felis, and *Pulex irritans*. Ticks are possibly concerned in transmission. Fouadin and stibisol (complex sodium salts of antimony) are the common therapeutic substances used, 12-18 treatments being necessary, but these drugs are very toxic to dogs and require careful use.—G. B. S. HEATH.

I. ORTLEPP, R. J. (1945.) The lung worm, *Filaroides osleri* (Cobbold) in South African bred dogs. (Preliminary note.)—*J. S. Afr. vet. med. Ass.* 16. 86-88. 1325

II. STEYN, H. P. (1945.) The lung worm, *Filaroides osleri* (Cobbold) in dogs: A clinical report.—*Ibid.* 88-89. 1326

I. Three cases are recorded of lungworm infestation in bull mastiffs. All three cases were diagnosed from finding the embryonated eggs and one was confirmed P.M. The eggs were obtained by swabbing the throat, or from mucus coughed up.

The worms are found in soft nodules at the bifurcation of the trachea and attached to its inner surface. They vary in size from that of a sorghum seed to that of a pea and have a reddish colour. The worms can be seen through the surface and the females may extrude their posterior extremities out of the swelling. The colour is a creamy white, the females being 10 mm. long and the males 6 mm. The life-history of the parasite is unknown but an intermediate host is probably necessary as in the related genus *Muellerius*.

II. S. describes two cases of this infestation in dogs. In the first there was marked loss of condition and marked dyspnoea, with fits of coughing followed by efforts at vomiting. Tracheal stenosis was diagnosed and laryngotomy performed with negative results. Worm eggs (*Filaroides*) were found in the mucus from the larynx. The dog was killed and numerous nodules produced by the worms were found P.M. causing an elevation of the tracheal mucosa at the bifurcation.

In the second case the symptoms were less pronounced. There was no emaciation and little dyspnoea, but fits of coughing and attempts at vomiting. Diagnosis was made by laryngeal swabs. Phenothiazine by the intratracheal route was found ineffective in treatment.

—E. M. ROBINSON.

See also absts. 1437-1439 (anthelmintics).

SPONTANEOUS AND TRANSMISSIBLE NEOPLASMS AND LEUCAEMIAS

* [INCLUDING FOWL PARALYSIS]

MASKAR, U. (1942.) Ueber Karzinome der Analgegend, besonders der Zirkumaldrüsen, beim Hunde. [Carcinoma of the anal region, with special reference to the circumanal glands, in the dog.]—*Schweiz. Z. Path. Bakt.* 5. 329-342. [English, French & Italian summaries.] Abst. from English summary.] 1327

Seven cases of carcinomatous tumours of the anal region of dogs 7-9 years old are described. Their relation to the sex and age of the dogs is evident. With one exception, which proved to be a basal cell tumour of the skin, their origin could be traced histologically to the circumanal glands.

BRACHETKA, J. (1942.) Über primäre Hautgeschwülste vom Drüsentypos und die sogenannten Basalzellengeschwülste in der Haut des Hundes. [Primary skin cancer of the glandular type and the so-called basal-cell cancer of the skin of the dog.]—*Wien. tierärztl. Mschr.* 29. 509-510. [Inaug. Diss., Vienna—only abst. given.] 1328

Glandular neoplasms of the dog's skin are not rare

and 57 cases are described and classified in four groups. In the first group are the adenomas of the sweat glands or hidradenomata solidum which are most frequently found on the head, neck, and back. The second group includes hyperplasias and adenomas of sebaceous glands which occur on the face and abdomen. In the third group are the epitheliomata adenoides cysticum or Brooks epitheliomas which are rare in dogs. The fourth consists of the basal cell carcinomas which are usually not malignant in spite of rapid growth. These tumours are best called carcinomata adenoides cutis.

—E. BOYLAND.

DE SENARCLENS, F. (1942.) Granulomatose lipéidique hépatique expérimentale chez le rat. [Lipoidal hepatic granuloma in the rat.]—*Schweiz. Z. Path. Bakt.* 5. 150-177. [In French: English, German & Italian summaries.] [English summary slightly amended.] 1329

Rats which were kept on a diet rich in cholesterol and given carbon tetrachloride, developed in their liver

granulomatous lesions composed of vacuolated reticulum cells. The lipid inclusions in these cells consisted mainly of lecithin. The appearance of these lesions was accompanied by cholesterinaemia and lipidaemia. The results of these experiments are in accord with the hypothesis of SCHAFF and WERNER on the genesis of experimental xanthomatosis.

MEIER, A. (1942.) Gibt es einen Zuckerkrebs? [Is there sugar cancer?—*Schweiz. Z. Path. Bakt.* 5. 226–237. [English, French & Italian summaries.] [English summary copied *verbatim*.] 1330

No sarcoma appeared in 56 rats which for several months had received a daily subcutaneous injection of a 50% glucose solution. The same negative result was obtained in 50 rats with a 5% glucose solution. The simultaneous injection on two different parts of the body of glucose solution and methylcholanthrene did not reveal any tumor localizing properties of glucose. In 6 rats so treated and which had survived the first 3 months a sarcoma had appeared on the place where methylcholanthrene had been applied but none on the place where the glucose had been injected.

NORAN, H. H. (1945.) Intracranial vascular tumors and malformations.—*Arch. Path.* 39. 393–416. 1331

This article consists of an extensive survey of the literature (140 references) dealing with intracranial vascular tumours. Particular attention is paid to classification and the following is suggested as suitable:—

- (1) Angiomatous lesions (adult vascular elements).
 - a. Parenchymal angioma.
 - b. Meningeal angioma.
- (2) Angioblastic lesions (embryonic vascular elements).
 - a. Parenchymal angioblastoma.
 - b. ? Angioglioma.
- (3) Miscellaneous vascular lesions.

—E. G. WHITE.

SHIMKIN, M. B. (1944.) Research activities of the National Cancer Institute [U.S.A.].—*J. nat. Cancer Inst.* 5. 77–88. 1332

The efforts of the American Society for the Control of Cancer, supported by various professional bodies, culminated in the passage of the National Cancer Institute Act, signed by the President of the United States on August 5th, 1937.

The Institute's activities include research at the Institute itself and also co-operative research with other institutions, and control, covering radium loans, training of clinicians in cancer work, co-operation with state and other agencies and education of the lay public.

The main part of the research work of the Institute is carried out at laboratories in Bethesda, Md. This article is a report of the activities of the Institute and of the work on cancer carried out by the United States Public Health Service prior to 1937. The main activities of the Institute have been devoted to experimental carcinogenesis, the cellular physiology, the chemical constituents of neoplasms, the treatment of experimentally induced tumours and the epidemiology of cancer in man (pre-cancerous history, mortality, occupational incidence, etc.). The war brought many difficulties, the most serious being depletion of professional and lay staff, but the work of the Institute was continued and conditions are presumably better now than when this article was written.—E. G. WHITE.

BITTNER, J. J., HUESBY, R. A., VISSCHER, M. B., BALL, Z. B., & SMITH, F. (1944.) Mammary cancer and

mammary structure in inbred stocks of mice and their hybrids.—*Science*. 99. 83–85. 1333

Virgin females of two cancerous strains of mice show a marked difference in the incidence of mammary carcinoma; one strain has an incidence of 4.9%, the other has an incidence of 72%. No major structural differences can be detected in the mammary glands of either strain or of their hybrids. The variation in the incidence of cancer appears to be due to characteristic differences in hormonal metabolism, in the broad sense, in the two strains. Such hormonal differences may result from the amounts of oestrogen produced or available for the stimulation of the mammary glands and/or from the sensitivity of the mammary glands to oestrogenic hormones. The inherited oestrogenic influence in transmitted as a dominant and plays a role in the genesis of spontaneous mammary tumours in virgin females of inbred strains and their hybrids. It is probably not identical with the "inherited susceptibility for spontaneous mammary cancer".

The authors advance the theory that hyperplastic or precancerous nodules in the mammary glands of mice result from the inciting influence of both the active milk agent and the oestrogenic hormones, and not solely from the action of the milk agent, as has been suggested previously.—I. W. BROCKLEHURST.

BARNUM, C. P., BALL, Z. B., BITTNER, J. J., & VISSCHER, M. B. (1944.) The milk agent in spontaneous mammary carcinoma.—*Science*. 100. 575–576. 1334

The milk agent in spontaneous or transplanted mammary carcinoma is inactivated when held at a temperature of 60°C. or over for one hour. It is stable at pH 5.0–10.2, but appears to be destroyed when held for two hours at pH 4.5. It is not inactivated by petroleum ether or acetone and is not appreciably soluble in these. It appears to be slightly precipitated by the basic protein salmine, at pH 5.5 and 6.8. [This is apparently a preliminary report, since the experiments described were not yet completed.]—I. W. B.

ARASÃO, H. B. (1943.) O vírus do mixoma no coelho do mato (*Sylvilagus minensis*), sua transmissão pelos *Aedes scapularis* e *aegypti*. [Myxoma virus in the Brazilian wild hare, *Sylvilagus minensis*, and its transmission by *Aedes aegypti* and *A. scapularis*.]—*Mem. Inst. Osw. Cruz.* 38. 93–99. [English summary.] 1335

Experiments with *Aedes scapularis* and *A. aegypti* are described in which myxomatous infection was transmitted to 40% of wild hares. The virus could be recovered from the proboscis of the mosquito but there was no evidence of multiplication. The disease produced in the wild rabbit was not as severe as that in the domestic rabbit, recovery being frequent.

—H. G. ARAMBURU.

TORRES, C. M. (1944.) Sobre a hiperplasia celular no mixoma infeccioso do coelho. [Cellular hyperplasia in rabbit myxoma.]—*Mem. Inst. Osw. Cruz.* 41. 233–302. [English summary.] 1336

In a study of hyperplasia in rabbit myxomatosis, T. studied the histological material provided by 22 rabbits infected by scarification of the back with rabbit myxoma virus.

T. discusses the particular problem of cellular hyperplasia in rabbit myxomatosis and with the aid of 41 photomicrographs and drawings describes cellular hyperplasia with a modified type of mitosis, in which the nuclear membrane is always present. Typical mitosis is almost completely absent.—H. G. ARAMBURU.

DISEASES, GENERAL

JARCHO, S. (1945.) Equal-area projections and the azimuthal equidistant projection in maps of disease.

—*Amer. J. publ. Hlth.* 35. 1005-1013. 1337

In this article, which is of special interest to epidemiologists, the type of map best suited for the demonstration of the geographical distribution of disease is discussed:

To most medical and veterinary scientists a map of the world means a map on the Mercator projection. This projection has limitations or disadvantages when used for showing the distribution of diseases: the size of the Arctic and Antarctic regions is, for example, greatly exaggerated; Greenland appears to be larger than South America although it is actually only about one-ninth of its area. The equatorial zones are disproportionately small. Territories which are of equal size on a Mercator map are not necessarily equal in area: Dutch Borneo appears to be equal in size to Iceland, although actually it is five times bigger. Most distances are distorted.

The misleading impression of the area of the world affected by malaria which is obtained from a map on Mercator's projection is shown by comparison with a map on Goode's homologous projection. The inadequacy of Mercator's projection for depicting diseases with a relatively restricted distribution is vividly shown by two maps of cholera, one on Mercator's and the other on an azimuthal equidistant projection. On Mercator's projection the endemic areas in China appear to be very widely distant from and quite unconnected with the endemic areas in India; the true connexion is quite obvious on the azimuthal equidistant projection. Equal-area projections, such as Goode's homologous projection, are defined as maps on which, if any number of pennies is spread out over various parts, the territory covered by each penny will be exactly equal in area to that covered by any other penny, hence the actual area affected by a disease in any two countries can be compared by inspection of the map. That is not possible with Mercator's map. In an azimuthal projection the distance between one focal point and all other points on the earth's surface is shown. Such maps are particularly useful for diseases, such as cholera, which tend to spread from a more or less well defined focus, and emphasize the important factor of distance.—M. C.

MAYORAL, P. (1942.) Los monos de Colombia como portadores de germen de enfermedades tropicales.

[Colombian monkeys as reservoirs of tropical diseases.]—*Publ. Lab. Hig. Nariño*, 1940-41. pp. 129-161. 1338

During investigation of the value of South American monkeys for work on Oroya fever and yellow fever, with the object of finding a substitute for imported *Macacus rhesus*, various species were examined for their susceptibility to different tropical diseases. Only one species was encountered which showed *Bartonella* after inoculation and no animal developed infection after inoculation with *Plasmodium malariae*. Natural infection with *Entamoeba histolytica* was encountered in one animal, with *Plasmodium* spp. in two animals, with a filaria of the genus *Acanthocheilone* in two animals, and with a trypanosome in two animals. It is suggested that the trypanosome was *T. cruzi*, but the organism could not be detected in sections of the heart or brain.—U. F. RICHARDSON.

ELLIS, J. H., & COOPER, C. T. (1945.) Suspected grass sickness in Northants.—*Vet. Rec.* 57. 474. 1339

Two cases of suspected grass sickness are recorded. Constipation, retching, regurgitation of fluid ingesta,

fluidity of stomach contents and lack of evidence of other disease support the authors' suspicions.

—G. B. S. HEATH.

ANON. (1944.) Sur une dermite spéciale aux bovidés.

[A dermatitis peculiar to bovine animals.]—*Bull.*

Acad. vét. Fr. 17. 236-239. 1340

This description by a clinician of a dermatitis affecting primarily the nostrils and limbs of young cattle between the ages of eight months and four years should be read in its entirety. The condition is often characterized by an initial acute febrile stage which may subside before being followed several weeks later by locomotor troubles, the appearance of lumps under the skin and rapid loss of flesh. On the other hand, there may be no acute phase. Cattle usually die in 3-8 months. Cracked and crusted lesions on the muzzle and nostrils precede the appearance of similar lesions at the coronet, heels and inter-digital spaces. There is commonly a furrow running from the internal canthus of the eye, caused by a mixture of tears and mucus. The limb lesions extend to the back of the pasterns and cannons. There is difficulty in rising and the animal takes the weight on its toes. Finally, if the condition is prolonged, hard isolated lumps appear on the flanks, buttocks and udder, followed by general recumbency, inability to take food, diarrhoea, emaciation and death from inanition. No macroscopic lesions are found P.M. The similarity of the symptoms to those seen in foot and mouth disease, lymphangitis and particularly the American form of ecthyma in sheep is stressed. Several hypotheses are advanced as to the possible aetiology. No effective treatment has been found.—H. I. FIELD.

WHEELER, W. J., VILJOEN, J. H. B., & ROBINSON, E. M. (1945.) An outbreak of severe stomatitis in cattle.—

J. S. Afr. vet. med. Ass. 16. 20-25. 1341

The authors describe a condition in cattle occurring on a number of farms in Northern Natal in the winter of 1943 and characterized by severe stomatitis. Marked salivation was observed; there was no actual lameness though some animals had slight stiffness in gait. Extensive erosion was seen on the tongue, extending from the tip to the pharynx and on handling it large patches of mucous membrane were detached, leaving a raw granulating surface. In some cases the horns became detached when grasped. Marked loss of condition was seen in most cases and there were some deaths. There was only slight fever in some cases. Foot and mouth disease was excluded by g. pig inoculation. No success attended attempts at transmission to healthy cattle and the cause could not be discovered.

—E. M. ROBINSON.

AHMAD, C. M. (1944.) Yokes and yoke galls in cattle in India.—*Indian Fmg.* 5. 165-167. 1342

A. notes the defects in the old-fashioned straight bar yokes and describes an improved pattern known as Mushtaq's universal portable double yoke. Some advantages claimed for this pattern are that it distributes uniformly the weight and pressure over both dorsal and lateral back muscles and that it can be easily adjusted to all sizes of necks. Detailed description is given of the cause and prevention of yoke galls. A properly constructed and adjusted yoke, its examination for cleanliness before use and prompt attendance to injuries are essential.—TUFAIL AHMED.

ROWLANDS, W. T. (1945.) A few observations on the control of disease in sheep.—*Vet. Rec.* 57. 489-491. Discussion p. 491. 1343

While the natural environment of sheep tends to keep them in good health, much research into sheep

diseases is needed. Therapeutic measures have little application to sheep, and emphasis should be laid on prophylactic measures. Parasitic and nutritional diseases furnish the most pressing problems. Collaboration between veterinarians and flock masters would be beneficial to both.—G. B. S. HEATH.

MOREAU, A. B. (1943.) Principales enfermedades del ganado porcino. [Principal diseases of pigs.]—*Agronomía, Lima*. 8. No. 33. 72-74. 1344

The diseases mentioned are TB., anthrax, actinomycosis, swine fever, swine pox, foot and mouth disease, louse infestation, echinococcosis, and ascariasis.—E. S. WIRTH, D. (1944.) Hämorrhagische Diathesen bei unseren Haustieren. [Haemorrhagic diathesis in domestic animals.]—*Berl. Münch. tierärztl. Wschr./Wien. tierärztl. Mschr.* June 23rd. 197-202. 1345

W. reviews the subject and adds his personal observations. The following conditions must be considered in a study of haemorrhagic diathesis:—the nature and number of red and white corpuscles and platelets, the coagulation time, the bleeding time, i.e., time during which a small wound will bleed, the reaction to the prick test, i.e., whether a small red spot is left by a pin prick or whether a pea-like swelling due to bleeding in the skin tissue results, the reaction to the checked bleeding test, i.e., whether bleeding checked by binding starts up again on unbinding, and the retraction of the blood clot.

Normal dogs had a bleeding time of $1\frac{1}{2}$ min., the time being dependent on vascular, intravascular and extravascular factors; there was no correlation with the coagulation time but an inverse relation existed with the time of retraction of blood clot and there was a relationship between the extent of retraction of clot and the platelet count.

Few authentic cases of haemophilia are recorded in the literature. An instance of eight deaths from bleeding among the 14 male but not among the three female offspring of a greyhound bitch mated four times with her male kin, and another of the death from bleeding of three male offspring of an Aberdeen terrier bitch, can probably be considered true haemophilia. By injecting a thrombocyte antiserum into dogs, characteristic cases of purpura haemorrhagica were produced in 63 dogs, characterized by prolongation of the bleeding time, positive reactions to the prick test and checked bleeding test, skin and nose bleeding, blood-stained stools and urine and reduction of skin elasticity. Large doses of the serum led to death; repeated injections caused immunity. In three natural cases observed by W., including one apparently caused by a mercurial ointment, there was diminution or total loss of blood platelets; histological study of all three cases revealed lesions of various organs; there was no leucocytosis but in one case there was leucopenia.

In 84.4% of cases of petechial fever of horses, the primary disease could be traced to an infection; the secondary condition was characterized by bleeding and inflamed oedematous swellings: suppurating lymph nodes were often found. A primary petechial fever has also been described. In three cases of epistaxis in race horses the affected horses had the stallion "Hermite" as a progenitor. Two other descendants of his which were nose bleeders had low blood platelet counts.

Bleeding after removal of the corpus luteum in cows may be due to inadequate pressure at the time of expression, but any of the factors concerned in blood clotting may be deficient. Conditions which may predispose to bleeding (e.g., a recent diet of sugar-beet tops, chronic septic conditions, etc.), are contra-indications to the operation.

Symptoms of Dürer's disease [pathological leucopenia in cattle fed on soya meal extracted with trichloroethylene] could not be produced by W. in rabbits but g. pigs on this diet died in 30-140 days with stasis of blood in the liver.

Cattle, and to a lesser extent sheep and horses, develop haematomas and prolonged clotting time when fed on sweet clover hay stored in a moist condition so that a poisonous principle, thought to be a dicoumarin, develops. Apart from the removal of the poisonous fodder, the treatment consists in blood transfusion; this can restore normal clotting in 15-30 min. Young cattle at the end of a period of poor stall feeding showed haematomas but no prolongation of clotting time. Prolonged chloroform narcosis causes prolongation of clotting time and bleeding in dogs due to depression of prothrombin and fibrinogen consequent upon liver damage.

Feeding with sugar-beet tops also caused prolongation of clotting time due, perhaps, to fixation of blood calcium by oxalate in the leaves, or to an intestinal catarrh causing diminished resorption of gall, or to poisoning by potassium.

A haemorrhagic condition having the appearance of morbus maculosus has sometimes followed injections in pigs against erysipelas. Morbus maculosus may also be due to an avitaminosis.

A haemorrhagic diathesis can result from vitamin K deficiency in the diet of hens, geese and ducks and can be produced experimentally when fat absorption is checked by blocking the bile duct. In hens, the bleeding time (4 min. 37 sec.) was shown to be less than the coagulation time (9 min. 30 sec.). When blood samples were being taken from the combs of poultry, it was observed that in cold wet weather fatal bleeding occurred in a number of cases while none occurred in warm dry weather.

Blood transfusion is an excellent general treatment; horse serum from a horse subjected to repeated blood letting has also been tried as has the subcutaneous injection of the patient's own blood; 0.2 ml. per kg. body weight of 1% Congo red solution caused an increase in the thrombocyte count with acceleration of the clotting time. The possible causes of bleeding are so many that in undiagnosed cases many treatments may have to be tried.—R. MARSHALL.

BIERRY, H. (1943.) Recherches sur les protéides sanguins à l'état normal et à l'état pathologique. [Blood proteins in the normal and in pathological states.]—*Bull. Acad. Méd., Paris*. 127. 447-451. 1346

B. reviewed the results obtained by various methods of fractionation of serum proteins and described work on euglobulins, which he had separated into several fractions. The two most clearly defined fractions he called euglobulin I and II. These compounds are glycoproteins and the carbohydrate portion is a galactoacetyl-glucosamino-mannose. Euglobulin II is present in the serum in greater quantity than is euglobulin I and contains a smaller amount of carbohydrate. The ratio nitrogen to carbohydrate is constant for each serum but varies with different specimens from different individuals and species.

The serum glyco-proteins are chemically distinct, the carbohydrate portion playing the part of a cement joining the polypeptide chains and at the same time being the point at which breakdown takes place. B. thinks the euglobulins are the most complicated molecules and classes the pseudoglobulins, less rich in carbohydrate, as compounds intermediate between euglobulins and crystalbumin (of Hewitt), the latter being a very simple protein. Finally he points out that changes in the serum proteins are noted in pathological

conditions and that the study of the carbohydrate portion of the protein molecule would give useful results.—T. E. GIBSON.

HUEPER, W. C. (1945.) Aortic abnormalities in dogs used for experimental purposes.—*Arch. Path.* 39. 375-380. 1347

Histological examination of the entire posterior aortic tract of 50 mongrel dogs of known or estimated age was made in order to determine the occurrence of "spontaneous" arterial lesions.

The commonest lesions found were those of the sclerosing type. The oedematous state of the inner part of the media of the aorta, from the level of the heart to the summit of the arch, found in young dogs is considered to be normal or associated with circulatory disturbances. In animals under five years of age lesions were not common and on this account no support is given to the suggestion that canine distemper is an aetiological factor in the development of arterio-sclerotic changes. In six of the 50 dogs a fibro-hyaline scar containing a moderate number of capillaries was found in the outer part of the media at the site of the aortic termination of the ligamentum arteriosum.

—C. W. OTTAWAY.

TORRES, C. M. (1943.) Miocardite espontânea do cão. [Spontaneous myocarditis in the dog.]—*Mem. Inst. Osw. Cruz.* 38. 65-72. [English summary.] 1348

T. discusses spontaneous myocarditis in a dog with a full description of the histopathology illustrated by three photomicrographs. Investigation for sarcosporidia, toxoplasms, *Histoplasma*, leishmania and *Trypanosoma cruzi* proved negative. [The previous clinical history of this dog was unknown.]—H. G. A.

CARLTON, L. M., JR., RASMUSSEN, R. A., & ADAMS, W. E. (1945.) Blast injury of the lung. Possible explanations of mechanism in fatal cases—an experimental study.—*Surgery.* 17. 786-793. [Abst. in *Bull. War Med.* 6. 74-75, copied *verbatim*. Signed: G. R. CAMERON.] 1349

Dogs, under morphine sedation, were subjected to increased intrabronchial pressure of two types: (1) pressure of 35-50 mm. Hg for a few seconds to 15 minutes, delivered at 28 cycles per minute; (2) single "blasts" varying from 70-110 mm. Hg, and lasting two to three seconds. All of the eight animals of group 1 showed mediastinal and interstitial emphysema, whilst four had subcutaneous emphysema and haemorrhage into the lungs. Three developed a pneumothorax and exhibited air in the pulmonary artery, pulmonary vein, venae cavae and right auricle. Small bullae were found over the lung in one, and coronary air embolism was present in 7 instances. All ten animals of group 2 developed mediastinal and interstitial emphysema, and seven had subcutaneous emphysema. Nine had bilateral pneumothorax, while eight showed pulmonary haemorrhages and coronary air embolism. One dog had air in the vena cava and right auricle, one had a dilated stomach, and two presented bullae over the lung. Coughing, by raising intrabronchial pressure, precipitated death. The authors emphasize the possible importance of coronary air embolism in those cases of blast injury where the cause of death is not otherwise adequately explained.

[Air embolism has not been a striking feature in most of the American and British experiments with air blast or under-water explosions, although the Germans have described it. The technique reviewed above differs from that of previous workers, in the much longer period of exposure to pressure. It is possible, too, that species differences may play a part. Pathologists with experience of human cases of blast injury

have not been impressed by the importance of air embolism.]

REISINGER, L. (1944.) Kommen Geisteskrankheiten bei Tieren vor? [Whether mental disorders occur in animals.]—*Dtsch. tierärztl. Wschr./Tierärztl. Rdsch.* 52/50. 352-353. 1350

R. discusses a number of possibly psychotic conditions described in the literature and seen by himself, but concludes that no clearly psychotic conditions occur in animals.—J. M. ROBSON.

PACCHIONI, G., & BIAVATI, F. (1942.) Recherche ed osservazioni sui fili di lana di ovini colpiti da malattie infettive. [Effect of diseases of sheep on the texture of the wool.]—*Nuova Vet.* 21. 9-11. 1351

Sheep were infected simultaneously with brucellosis and TB. and samples of wool taken at the time of infection and shortly before the animals died from TB. were examined for tensile strength, elasticity, diameter of fibres, etc. The samples taken at the termination of the disease were inferior to those taken at the beginning. The authors consider that these findings are of importance to the textile industry.—H. I. FIELD.

BROWN, W. H., & PEARCE, L. (1945.) Hereditary achondroplasia in the rabbit. I. Physical appearance and general features. II. Pathological aspects. III. Genetic aspects; general considerations.—*J. exp. Med.* 82. 241-260, 261-280 & 281-295. [Authors' summaries copied *verbatim*.] 1352

I. An achondroplastic condition in the rabbit has been described. It is present at birth and is characterized by size reduction, by disproportion of bodily parts, most marked in the extremities, and by an invariably lethal effect. The animals are still-born or die very shortly after birth.

In physical appearance and in the character of the skeletal changes as shown by X-ray photographs, achondroplasia in the rabbit has a remarkable resemblance to the disease in man and in cattle and dogs.

The condition which first occurred in offspring of pure bred Havana rabbits is inherited. In anticipation of the later discussion of this phase of the study, it can be stated that the mode of inheritance is on the basis of a simple recessive unit factor and that the appearance of non-achondroplastic transmitters (heterozygotes) is that of normal animals.

II. Pathological observations on hereditary achondroplasia in the rabbit have been described. At autopsy, the chief features of interest are: reduced size with disproportionately shortened extremities and large head, cutaneous and subcutaneous edema of variable degree and distribution, small shortened bones with a cartilaginous appearance and texture, immature teeth, and cleft palate in one-fourth the cases; blood-stained fluid in the thoracic and abdominal cavities; a comparatively small heart pointing to the right of the mid-line, a very large firm thymus, a large pale soft spleen, a large swollen liver with red mottling, and a stomach distended with thin greenish mucus but no milk.

The mean relative weights of all organs in terms of the net body weight were larger than those of normal new-born litter mates. The mean actual weights of the kidneys, the brain, and especially the spleen and the thymus were also larger than their respective normal values, those of the heart, liver, and adrenals were slightly smaller, while that of the pituitary was the same.

Histologically, all endochondral cartilages show marked abnormalities of differentiation with pronounced deficiency of ossification. Calcification of membranous bones is likewise deficient. The histological abnormalities of the long bones are very similar to, if not identical with, those characteristic of human fetal chondrodystro-

phy, the creeper fowl condition, the "bull-dog" calf, and achondroplasia of the dog.

No histological evidence was found in any organ which would suggest a basis for a responsible causal agent of the abnormality. Minor to marked vascular dilatation and congestion and edema is a variable feature but is fairly widely distributed.

The changes in the thyroid indicate an active gland. The cellular pattern of the pituitary is characterized by some increase in basophilic cells. The lymphoid elements of the spleen are more or less depleted. The hemopoietic tissue in the spleen and liver is reduced in amount. In blood obtained from the heart, there is a reduction in the numbers of red and white cells and platelets and in the hemoglobin content as well; immature cells and particularly normoblasts are comparatively numerous.

III. Hereditary achondroplasia (chondrodystrophia foetalis) in the rabbit has been described in the present and preceding papers. It is the first instance of this abnormality in rodents to be reported. The variation arose in pure bred Havana stock.

The abnormality is determined by the expression of a simple recessive unit factor, affected individuals being homozygous for the factor. Females are somewhat more frequently affected than males, but the character is not sexlinked. Rabbits heterozygous for the factor as determined by appropriate breeding tests have a perfectly normal appearance at birth and in later life.

The condition appears to be determined solely by the genetic constitution of the animal. Attention was drawn to the fact that although the development of the achondroplastic form proceeds to birth at term, death

See also absts. 1355 (congenital malformations in swine), 1422 (puerperal diseases of cattle), 1423 (osteomyelitis), 1472, 1473 (livestock disease in India).

NUTRITIONAL AND METABOLIC DISORDERS

I. ROSS, O. B., PHILLIPS, P. H., BOHSTEDT, G., & CUNHA, T. J. (1944.) Congenital malformations, syndactylism, talipes, and paralysis agitans of nutritional origin in swine.—*J. Anim. Sci.* 3. 406-414. 1355

II. CUNHA, T. J., ROSS, O. B., PHILLIPS, P. H., & BOHSTEDT, G. (1944.) Further observations on the dietary insufficiency of a corn-soybean ration for reproduction of swine.—*Ibid.* 415-421. 1356

I. Sows of various breeds averaging about 55 lb. in weight were fed a ration of 82-85% ground maize, 11-0% soybean oil meal, 5-0% alfalfa meal, 0-65% CaCO_3 and 0-5% iodized NaCl and were bred at approximately eight months of age. Some of the sows were infertile; in others many services were required before conception occurred and the litters produced contained a high proportion of malformed piglets. The nature of the malformations is described. Dosing affected unweaned pigs with various agents including liver concentrate powder, riboflavin, shark liver oil, nicotinic acid, and ascorbic acid, either singly or in various combinations, did not alter their condition.

II. When the above ration was supplemented with 10% alfalfa meal or by soybean lecithin plus pyridoxine, normal reproduction was obtained.

—J. A. J. VENN.

SATTERFIELD, G. H., CLEGG, R. E., & HOLMES, A. D. (1944.) Vitamin A content of sheep's colostrum and milk.—*Food Res.*, III. 9. 206-211. [Abst. in *Dairy Sci. Abstr.* 6. 208, copied verbatim.] 1357

Fifteen well-developed, well-fed Hampshire ewes were used in a study to determine the vitamin A content of sheep's colostrum and milk during early lactation.

regularly occurs at the time of or very shortly after parturition. This feature of the condition is briefly discussed.

*KRANZ, S. (1943.) Pharyngeale Dignathie beim Kalb. [Pharyngeal dignathia in the calf.]—*Inaug. Diss., Hanover*. [Abst. from abst. in *Dtsch. tierärztl. Wschr./Tierärztl. Rdsch.* 52/50. 332.] 1358

Anatomical and embryological consideration of a case seen in a three-day-old calf.—E. COTCHIN.

SPRIGGS, D. N. (1945.) Double external os in cattle. —*Vet. J.* 101. 138-143. 1354

S. presents the clinical history and examination findings of ten cows and heifers (one seen P.M. only) with structural irregularities in the region of the cervix uteri. In six cases the abnormality consisted of a vertical band of varying thickness extending from roof to floor of the anterior vagina across the os uteri externum. In the remaining four cases there was evidence of double cervix and more complete division of the anterior vagina.

In spite of this structural impediment the fertility rate was high. In the animals with evidence of true double cervix, artificial insemination into the patent os was achieved with success; this method is strongly recommended for similar cases. The surgical treatment adopted was incision of the band which is best performed in the non-pregnant animal, although it may be necessary to operate at parturition if the band interferes with delivery.

The condition is attributed to persistence of part of the median walls of the Muellerian ducts.—C. W. O.

During the first week a rapid decrease occurred, as in cow's colostrum. The average vitamin A content was 9-84 Lovibond units per g. of colostrum and milk on the first day of lactation, 4-57 on the third day and 3-97 on the seventh day. If however the figures for all ewes which produced lambs that did not grow to maturity are discarded, the average content on the first, third and seventh day were 10-11, 3-98 and 1-13 Lovibond units per g. The latter values are probably more typical. (Twelve of the 22 lambs born were born dead. This high mortality figure is ascribed to the feeding of soybeans.) At the end of the second week of lactation the average vitamin A content for ewes whose lambs reached maturity was 0-54 Lovibond units per g., and at the end of the third week 0-27 Lovibond units per g. Throughout the first 3 weeks of the lactation period the vitamin A content of the colostrum and early milk of the two-year-old ewes averaged somewhat higher than that of the three-year-old animals. [Comparable animals on the same day of lactation varied widely with regard to the vitamin A content of their colostrum and milk.]

SCHILLER, A. A., STRUCK, H. C., & REED, C. I. (1942.)

The influence of rickets and of the healing of rickets on the mechanical properties of the tibiae of rats.—*Amer. J. Physiol.* 138. 27-33. 1358

This article describes a series of experiments to determine whether the tibiae of rats which had recovered from rickets were less resistant to lateral breaking stress than those of normal rats. An apparatus for applying a quantitative breaking test is described. Although in two of a series of nine experiments significant differences in the resistance to lateral breaking stress were obtained,

in general it appears that provided a period of 65 days is allowed for recovery from rickets there is no significant difference in the resistance to this particular test of normal bone and recovered rachitic bone. It is suggested that the bone metabolism may be upset in the recovered rachitic bone, and that the arrangement or shape of the bone crystals may be altered.—R. F. G. SANDERCOCK.

ELVEHJEM, C. A., GONCE, J. E., Jr., & NEWELL, G. W. (1944.) The effect of vitamin E on reproduction in dogs on milk diets.—*J. Pediat.* 24. 436-441. [Abst. in *Dairy Sci. Abstr.* 6. 186, copied *verbatim*.] 1359
Dogs kept for long periods on a diet of evaporated

See also absts. 1443 (vitamins and wound healing).

PHYSIOLOGY, ANATOMY AND BIOCHEMISTRY

*ZIMMERMANN, A. (1942.) [Ageing.]—*Közl. Összehas. élet- és kórtan Köréből.* 30. 398. [Abst. from abst. in *Berl. Münch. tierärztl. Wschr./Wien. tierärztl. Mschr.* February 4th. 48. (1944.)] 1360

Ageing is due not only to wear and wasting, to a decline in the capacity for resistance, or to disorder of the endocrine glands, but also to dehydration, and a disturbance of the physical and chemical condition of the body. The colloids of the cell plasma lose their hydrophilic nature, the molecules draw closer together and the water content of the ageing body decreases.

—A. C. SMITH.

I. *ZIMMERMAN, A. (1942.) [Rigor mortis.]—*Allatorv. Közl.* 39. 215. 1361

II. *ZIMMERMANN, A. (1943.) [Rigor mortis.]—*Közl. Összehas. élet- és kórtan Köréből.* 31. 305. 1362

[Absts. from absts. in *Berl. Münch. tierärztl. Wschr./Wien. tierärztl. Mschr.* February 4th. 48. (1944.)]

I. The chemical change brought about in the muscles in rigor mortis needs further investigation since the causes and nature of this condition are not yet clear. Several theories have been formulated and there appears to be a relationship between the swelling of the muscle colloidal tissue and acid formation after death. The formation of lactic acid from glycogen and its role in rigor mortis are described.

II. When circulation of the blood ceases, chemical change takes place in the muscles which brings about rigor mortis. The H-ion concentration of the muscle tissue rises, partly through formation of lactic acid, and the contractive colloidal substance of the muscle fibres is distended. The decrease in glycogen in muscle tissue in rigor mortis can be proved by the violet red colour test which points to lactic acid formation.

—A. C. SMITH.

KNODT, C. B., & PETERSEN, W. E. (1945.) Studies of the carbohydrate metabolism of mammary gland tissue in vitro. I. Production and utilization of various carbohydrate substances.—*J. Dairy Sci.* 28. 415-429. 1363

By perfusing excised mammary glands with glucose it was found possible to raise the tissue glycogen content to a level comparable with that of the intact mammary gland. By incubation of the perfused tissues some of the glycogen formed during perfusion was converted into lactose. Although this observation does not prove the normal course of lactose synthesis in the mammary gland, it nevertheless reveals a possible method by which several compounds could be converted into lactose.

The amount of glycogen in minced mammary tissue could not be increased by incubation with glucose, lactic acid, pyruvic acid or citric acid separately, either

milk with mineral and vitamin D supplements produced succeeding litters of short-lived pups suffering from muscular dystrophy and haemorrhages. Further supplementation of the diet with vitamin B, vitamin K and up to 25 mg. of *a*-tocopherol a week during gestation did not improve the condition of the litters. A similar effect was produced by feeding raw milk, aerated in the presence of FeCl₃. To provide for a healthy litter, a supplement of 40 mg. of *a*-tocopherol weekly was needed. Milk which had been boiled and acidified with 6 ml. of lactic acid per l. did not produce any deficiency symptoms in the pups.

in the presence or absence of added glycogen. By incubating minced mammary tissue with glucose, glucose and lactic acid, maltose and glycogen, lactose formation could be demonstrated, and lactic acid was formed by incubating tissue alone or with the addition of glucose, maltose, glycogen, pyruvic acid and citric acid. Experiments in which the tissue metabolism was carried out at varying hydrogen ion concentrations suggest that over the range 6.6-7.2, pH is not a factor in lactose synthesis.—A. EDEN.

KEYES, E. A. (1944.) Pre-partum milking.—*Milk Dlr.* 33. No. 12. 50 & 52. [Abst. in *Dairy Sci. Abstr.* 6. 156, copied *verbatim*.] 1364

Cows milked before calving yielded about 1 lb. of milk on the first day of milking, and increased at the rate of 1 to 2 lb. a day until the third day before calving when the increase was at the rate of 5 to 6 lb. a day. The highest daily yield ever obtained from a cow before calving was 3½ lb. On the fourth day after calving the pre-partum milked cows averaged 42 lb. and the control cows 37 lb. Total solids and butterfat percentage, variable at first, gradually became normal as the time of calving approached.

SJÖBERG, K. (1940.) Die Stabilität der organischen Phosphorverbindungen und Phosphatase in Pferdeblut bei dessen Aufbewahrung in vitro. [The stability of organic phosphorus compounds and phosphatase in horse blood.]—*Acta physiol. scand.* 2. 125-138. [In German.] Reprinted in *Medd. Vet.-Högsk. Stockh.* 14. (1940.) 1365

Hydrolysis of phosphoric esters in stored horse blood is extremely slow at 17°C. so that negligible amounts of inorganic phosphate are liberated in two days and hydrolysis only occurs after haemolysis. At 37°C. the form of the erythrocytes changes, haemolysis is fairly rapid and hydrolysis of the phosphoric esters present is complete in three days. Both plasma and corpuscles contain a phosphomonoesterase but the corpuscles contain a phosphoric ester which is not hydrolysed until the red cells are haemolysed.—E. B.

GERMAN, V. A. (1940.) Vliyanie vegetativnoi nervnoi sistemy na perifericheskii sostav krovi loshadi. [Influence of autonomic nervous system on peripheral blood composition in horses.]—*Rabot. XIII Plen. vet. Sekt. Akad. sel'khoz. Nauk, Moscow, 1939.* [Collected Works.] pp. 78-81. 1366

Stimulation of the peripheral nerves of the autonomic nervous system produced no effect on the isohaemagglutination reaction of the blood serum. As a result of stimulation of the vagus nerve, the numbers of thrombocytes in the peripheral blood decreased, whilst the numbers of lymphocytes and eosinophiles increased, the blood viscosity was lowered, the amount of blood sugar was reduced and the amount of gluta-

thione increased; the alkali reserve and the amount of Ca decreased and acetone appeared in the urine. Such blood, when transfused into a dog, caused a marked decrease in the pulse rate.

Stimulation of the sympathetic nervous system gave results in all cases exactly opposite to those obtained by stimulating the vagus nerve.—L. LEVENBOOK.

FOURIE, J. M. (1945.) The excretion of tortoise shells by cattle.—*J. S. Afr. vet. med. Ass.* 16. 84-85. 1367

In the Vryburg area of Bechuanaland, tortoise shells are often found in the ruminal contents of cattle. As tortoise carcasses play a part in the production of botulism in cattle their rate of passage through the animal is of interest. In the experiments carried out, in which a large number of shells were dosed to nine different cattle, nearly all the shells were excreted in 10-14 days. A large number of shells were excreted on the first day after drenching and up to the third day many shells were brought up in cuds and excreted.

—E. M. ROBINSON.

KURASHOVA, L. A. (1940.) Perevarivanie belkovykh komponentov korma v norme i pod vliyaniem kalomelya, khloral-gidrata i glauberovoi soli, po opytam na fistul'nykh loshadyakh. [The influence of calomel, chloral hydrate and sodium sulphate on the digestion of protein in horses with a surgically produced fistula.] —*Rabot. XIII Plen. vet. Sekt. Akad. sel'khoz. Nauk, Moscow, 1939.* [Collected Works.] pp. 45-50. 1368

The variation in the "peptide coefficient" of the chyme in the equine gastro-intestinal tract (calculated from N determinations), was used as a criterion in estimating the effect of calomel, chloral hydrate and Glauber's salt on protein digestion.

Calomel administered *per os* increased the secretions of the digestive glands and hence the digestive action of the gut enzymes on the food proteins. Chloral hydrate had no such effect when injected intravenously. 100 g. doses of Glauber's salt produced a slight but continuous increase in protein digestion, whereas 300 g. doses produced an intermittent effect, but of greater intensity.—L. LEVENBOOK.

ARMSTRONG, P. B. (1945.) Esterasopenic and esterasonic peripheral nerve terminations.—*Science.* 101. 327. 1369

Peripheral nerve fibres have been classified as cholinergic and adrenergic. It is suggested that there are two types of cholinergic nerve fibres, those at whose terminations there are relatively high concentrations of cholinesterase, and which might be termed esterasonic, and those at which cholinesterase is absent or present only in non-demonstrable concentrations for which the term esterasopenic is suggested.—C. W. O.

MELLO, M. I. (1944.) Estudos e revisão dos principais testes para o diagnóstico precoce da gravidez. I. Testes biológicos. [Study and revision of the principal tests for the early diagnosis of pregnancy. I. Biological tests.]—*Mem. Inst. Osw. Cruz.* 40. 355-374. 1370

This is a review, quoting 63 references, of tests for the early diagnosis of pregnancy using mice, rats, rabbits, g. pigs, fish and frogs. In M.'s opinion, the most reliable test in rats is injection of immature female rats with urine, hyperaemia of the stroma and capsule of the ovary being apparent within 2-24 hours in positive cases.—H. G. ARAMBURU.

ANON. (1945.) Cattle breeding policy.—*Indian Fmg.* 6. 199-200. 1371

The problem of raising Indian milch breeds appears to be comparable to that of raising beef cattle in S. America where the introduction of "blood" from

Indian cattle gave remarkable results. From the success obtained there, the introduction of high-milking foreign breeds in India may seem advisable. In S. America, however, potentially very high-producing animals were introduced into an adverse environment which prevented their production rising to the height that food supply would permit; the introduction of Indian "blood" was a solution. Indian cattle on the other hand can withstand the rigorous environment but their ability to produce is limited by the food supply.

Until the potentiality of Indian milch breeds is fully tested under the best conditions of nutrition, cross-breeding with foreign stock cannot be advocated.

—S. GUHA.

MILOVANOV, V. K. (1945.) Spособy sluchki i ustranenie yalovosti. [Methods of mating and the elimination of sterility in farm animals.]—*Iskusstvo. Osemen. sel'khoz. Zhivotn.* 2. 49-54. 1372

Sterility in cattle has apparently increased of late in the U.S.S.R., and M. discusses its possible connexion with the increasing use of artificial insemination, producing statistical evidence, however, that this tends rather to decrease sterility in herds where it is widely practised and pointing out that under more primitive conditions, where random natural copulation is employed, sterility is equally widespread; as a result of lack of scientific observations, this fact has not been widely recognized.

M. refutes, at least for farm animals, the hypothesis of MASHKOVTSSEV that the presence of a male is essential for the fulfilment of the sexual cycle of the female; he concedes, however, that the presence of a male as part of the external environment may be a factor in hastening oestrus and possibly ovulation. By scientific methods, sterility was greatly reduced in herds that had never seen a bull.

The various causes of sterility are discussed briefly under the headings, incorrect feeding, especially during winter, incorrect housing and bad hygiene, epizootic diseases, and random and uncontrolled mating. Under the last heading, M. deals with barrenness due to sterility in the male, incorrect technique of artificial insemination, etc. He also stresses that highly specialized inbreeding, e.g., for high milk production or other desirable features, may adversely affect fertility.—L. L.

SMIRNOV-UGRYUMOV, D. V. (1945.) Ratsional'noe ispol'zovanie bykov-proizvoditelei i uchenie akademika I. P. Pavlova. [The rational utilization of pedigree bulls for breeding, as influenced by the work of I. P. Pavlov.]—*Iskusstvo. Osemen. sel'khoz. Zhivotn.* 2. 55-79. 1373

Observations and experiments on bulls in the field and buck-rabbits in the laboratory, made in the light of PAVLOV's work on the activity of the higher nervous centres and "conditioned reflexes", leads the author to arrive at the following conclusions on obtaining semen from bulls.

Before an attempt is made to obtain semen by means of an artificial vagina, a bull should be thoroughly accustomed to its surroundings, to the presence of the operator(s) and the essential equipment and to handling of its prepuc; it should ignore any attention paid to the penis by the operator. Bulls should not be allowed to serve a cow immediately she is presented, but should be led past her two or three times. On the other hand, service should not be unduly delayed, otherwise inhibitory sexual reflexes may occur. A cow that is habitually employed for obtaining semen from a bull, should at all other times be kept isolated from him; otherwise her presence may become a "conditioned reflex", and at the critical time she will not excite the

bull sexually. Bulls should be permanently kept at the sites at which semen collections are to be made. In this manner externally induced inhibitions which may occur at the commencement of service are reduced. Bulls that serve once every 2-3 days will usually mate freely, but if semen be required more frequently, then it is essential that "blind" approaches, when the bull is only allowed to approach and smell, but not to serve the cow, should alternate with normal services. The conditions under which the semen is obtained should be frequently varied, e.g., by changing the cow, or having the same cow covered with a coloured horse-cloth and/or rubbed with wormwood or other scented substances; the actual place of service may also be changed. Should semen be required from a bull twice within 24 hours, the second act should rapidly succeed the first. A bull lacking sexual interest as a result of internal inhibitory reflexes, should be taken from the cow back to his accustomed yard or stable. The conditions of coitus having been changed, a second attempt may be made in not less than 2-3 hours. Should this not have the desired effect, the cow may be changed for one of another breed, for one in heat, or for one in a different stage of heat. Light mechanical stimulation, such as beating the bull may be tried; frequently, leading the cow slowly away has the desired effect.

—L. LEVENBOOK.

SOLOVEI, M. Y., & GERASIMOVA, A. A. (1945). Oplodotvoryaemost' i embrional'noe razvitiye ploda u korov pri osemnenii v raznye periody okhoty. [Impregnation and embryonic development as influenced by insemination of cows at different stages of oestrus.] —*Iskusstvo. Osemen. sel'khoz. Zhivotn.* 2. 189-194. 1374

Previous experiments indicated that insemination of cows during the second half of oestrus produced the best results. In order to test the theory that this was related to the length of life of the sperms in the sexual tract of the cow, further inseminations were carried out at various times during and after oestrus, with the following results.

Two of six cows inseminated in the first half of oestrus (20-26 hours before ovulation), and all of six inseminated in the second half (10-15 hours before ovulation) became pregnant. Of four cows served after oestrus, or less than ten hours before ovulation, three became pregnant; a single cow inseminated about six hours after ovulation, became fertile, but the embryo soon degenerated.

The authors describe the microscopic characters of embryos 2-30 days old, comparison being made with degenerating embryos.—L. LEVENBOOK.

BESKHLBNOV, A. V. (1940). Sroki ovulyatsii u korov. [Ovulation time in cows.]—*Rabot. XIII Plen. vet. Sekt. Akad. sel'khoz. Nauk, Moscow, 1939.* [Collected Works.] pp. 27-30. 1375

The occurrence of ovulation in cows was studied by rectal palpation. B. concludes that ovulation occurs on an average about 25 hours after the commencement of oestrus, i.e., soon after symptoms of "heat" have ceased. Follicles were found to develop more frequently in the right ovary than in the left.—L. LEVENBOOK.

I. SOLOVEI, M. Y. (1945). Vliyaniye chisla spermatozoidov, vvodimyykh pri iskusstvennom osemnenii, na oplodotvoreniye i razvitiye ploda. [The effect of the sperm concentration used in artificial insemination on impregnation and on the development of the offspring.]—*Iskusstvo. Osemen. sel'khoz. Zhivotn.* 2. 141-154. 1376

II. SOKOLOVSKAYA, I. I. (1945). Analiz vliyaniya chisla spermatozoidov na oplodotvoreniye i kachestvo

potomstva. [An analysis of the effect of sperm concentration on impregnation and on the development of the offspring.]—*Ibid.* 154-168. 1377

I. Examining the ova of rabbits about 46 hours after insemination, S. found that usually each ovum was penetrated by up to 100 spermatozoa which could be found in between the blastomeres and the hyaline layer. As some were active and others inactive, he concluded that penetration by the spermatozoa must occur over a period of time. Sperms were also found penetrating the cells of the mucous membranes of the uterus and Fallopian tubes and the lumen of the uterine glands and their epithelia. In fertilized does, the mucous membrane cells showed characteristic changes; in addition to those with normal nuclei, there were crescent-shaped cells and much smaller ones, with associated dark nucleoli. Mitotic cells were common; the mucous membrane cells became haemorrhagic and the tissue was invaded by leucocytes. S. presumes that these changes are caused by the presence of the sperms.

Experiments conducted with a view to determining the minimum numbers of sperms required for insemination showed that of four does inseminated with 25,000-50,000 sperms, two aborted, and two produced a few young of a weak and non-viable character. Normal litters were produced with 100 thousand to 500 million sperms.

In similar experiments on pigs, 10^8 to 2×10^{10} sperms produced smaller and lighter farrows than 7×10^{10} to 12×10^{10} sperms, which resulted in normal farrows of average weight at birth.

No explanation is offered to account for the influence of the sperm numbers on the viability of the resulting progeny.

II. By artificially impregnating does with doses of 100 thousand, 50 million, and 500 million sperms respectively and allowing controls to mate naturally, S. showed that the only significant difference in the resulting progeny was the lower number of young in the litters produced by the lowest sperm number. The viability of the progeny produced by the largest dose and their blood haemoglobin content were somewhat lower than the others but at four months of age these differences no longer existed. [The figures as given are obscure if equal numbers of does were used for each dose, since there was no significant difference between the total numbers of young produced by the different groups.]

The effect was also investigated of adding various numbers of sperms from other species, mostly bulls, to normal and subminimal quantities of rabbit sperms.

Thus, whereas 20% of the does inseminated with five thousand normal sperms were successfully impregnated, 70% became pregnant when 100 million bull sperms were added to the above amount; the low viability of the litters of the former was not increased. The characteristics of the progeny derived from similar experiments are discussed.

In vitro experiments with isolated ova and droplets of "mixed" sperms are briefly described, but the conclusions appear to be rather indefinite. In the discussion, the results generally obtained are compared in a number of tables with those of other authors.—L. LEVENBOOK, WESSELMANN, R. (1944.) Besamung bei Pferden. [Insemination of horses.]—*Dtsch. tierärztl. Wschr./Tierärztl. Rdsch.* 52/50. 307. 1378

This short note records W.'s success with artificial insemination of mares on a small scale. He mentions that the procedure is often adopted by stud grooms and that, considering the primitive method used (a bicycle pump), it is strikingly successful. During the last

season W. inseminated five mares which had previously failed to conceive: four became pregnant. One of the mares was inseminated with semen sent a considerable distance (eight hours in transit). The success with even the crudest method suggests that attention to asepsis is less important than ensuring insemination at the right time.—E. G. WHITE.

MILOVANOV, V. K. (1945.) Vliyaniye metodov iskusstvenno osemneniya na kachestvo potomstva. [The effects of different artificial insemination methods on the quality of the offspring.]—*Iskusstvo. Osemnen. sel'khoz. Zhivotn.* 2. 111-140. 1379

Rabbits of various breeds were artificially inseminated with semen treated in a variety of ways. From the results of insemination with mixed semen derived from two breeds of bucks, it appeared that the ovum has a selective attraction for sperms of breeds different from that of the doe; tentative suggestions are made as to the mechanism of this phenomenon. Cross as opposed to pure breeding produced larger and harder litters. Insemination with 0.01-5.0 times the normally ejaculated amount had no effect on the progeny; the limits of successful fertilization were reached at about 0.001 times the normal amount. In insemination involving the use of small amounts of mixed semen selective action was very marked; this was not the case when larger quantities than normal were introduced. The smaller quantities produced a preponderance of females in the progeny, but the litters were smaller and less viable, only two-thirds of the young being alive at four months of age.

In the three generations studied, semen stored for up to four days at 0°C. produced normal progeny. The effect of oxygen was shown by dividing a sample of semen into two: one portion diluted with isotonic K_2SO_4 was freely aerated and the other, diluted with glucose-tartrate buffer, was kept under conditions completely lacking in O_2 , both samples being stored for 18-25 hours at 12°-18°C. before use. The aerated semen did not keep well and produced smaller numbers of animals, which were, however, more viable, larger, and longer lived; semen stored anaerobically kept better and produced larger litters but the animals were smaller, less viable and shorter lived, about 50% of the males being abnormal, with a deformed spine, bent and weak limbs, and abnormally slow sexual development.—L. LEVENBOOK.

I. EVLAPIEVA, N. A. (1945.) Vnutrennee tormozhenie plovnykh refleksov u krolikov-samtsov. [Internal inhibition of the sexual reflexes in buck rabbits.]—*Iskusstvo. Osemnen. sel'khoz. Zhivotn.* 2. 80-100. 1380

II. SMIRNOV-UGRYUMOV, D. V. (1945.) O tipakh nervnoi deyatel'nosti (temperamentakh) samtsov-proizvoditelei. [Types of nervous activity of temperament in breeding males.]—*Ibid.* 101-110. 1381

I. Fifteen buck rabbits of different breeds were used to determine the relationship between "conditioned reflexes", nervous sexual inhibition and mating. Experiments were carried out in a specially constructed partitioned hutch, the doe being separated from the buck by a sliding shutter, or a wire gauze. Bells of different tones supplied the external stimulus to which the animals were "conditioned". The time taken to mount the doe and the volume of semen at ejaculation were used as criteria for the sexual behaviour.

The experiments were designed to test PAVLOV's theory regarding the division of animals into types according to their nervous reactions, each having its own type of sexual behaviour. The bucks, although all treated identically, showed wide individual variations. Thus, in one rabbit it was impossible to produce any

inhibition of the sexual reflexes, the rabbit mating continuously throughout; in the others it was shown that the more frequently matings occurred, and the more monotonous the conditions, the sooner internal inhibition of the sexual reflexes arose, with the eventual result that the rabbits refused to mate. Buck rabbits of a steady nervous type were most, and those of an "unbalanced" or "uncontrolled" type were least susceptible to internal inhibitions. In animals of a weak nervous type, sexual reflexes were easily inhibited by external factors.

Buck rabbits conditioned to associate mating with the ringing of a bell would, after inhibition had developed, fall asleep at the sound. An effective method of restoring the sexual reflex in such cases was to alternate mating in the specially constructed hutch in which the buck was separated from the doe by wire mesh, except at the moment of mating, with normal mating in the ordinary type of hutch.

From these experiments with rabbits E. suggests that the development of inhibition of the sexual reflex in bulls at artificial insemination centres could be prevented by making the conditions of mating as variable as possible.

II. The author describes further work on the application of the theories of PAVLOV on mating buck rabbits in the laboratory and bulls in the field.

Following his classification, the bucks were divided into groups according to their nervous disposition; i.e., strong or weak, depending on the rapidity with which they became conditioned to reflexes. The former category could be sub-divided into the well-balanced or steady, and the unbalanced types, according to whether the inhibitory processes were, or were not, well developed. The balanced animals were further sub-divided into quick or lively, and slow or quiet, varieties, the distinction being the rapidity with which both excitatory and inhibitory conditions developed.

Varying stages of conditioning to a mating reflex produced by the ringing of different bells, and varying periods of time between the stimulus and the response, i.e., coitus, were used as variables in studying the mating behaviour of the different types of bucks. These "laboratory" results were then applied at the artificial insemination centre to bulls, which were shown to conform to different nervous types from those of the rabbits, necessitating different mating conditions if consistent yields of active semen were to be obtained. The behaviour of different bulls at coitus and the conditions required for them are described in the general discussion and summary. The conclusions appear substantially the same as given in previous papers of this series.—L. LEVENBOOK.

VOLOSKOVA, A. P. (1940.) Profilakticheskie svoystva khimipreparatov pri follikulinovykh abortakh u krolikov. [Effect of certain chemicals on abortion in rabbits produced by injection of folliculin.]—*Rabot. XIII Plen. vet. Sekts. Akad. sel'khoz. Nauk, Moscow, 1939.* [Collected Works.] pp. 40-44. 1382

It was shown that a dose of 400 mouse units of folliculin (oestrone) caused abortion in rabbits. This abortion-producing effect could be largely inhibited by injections of atropine or of "certain ammonia compounds". These substances increase the gestation period in the rabbit 2-5 days and shift the acid-base equilibrium of the blood to the acid side.—L. L.

VAN DRIMMELEN, G. C. (1945.) Intraperitoneal insemination of birds.—*J. S. Afr. vet. med. Ass.* 16. 1-6. 1383

The technique for artificially inseminating hens is described in detail. A syringe with a stout exploring

needle 80 mm. long and 1.5 mm. in diameter is used to deposit the sperm in the ovarian region in one or several localities.

Fowls could be inseminated successfully during all seasons and fertile eggs were obtained in 21 out of 23 hens. The minimum period from insemination to the laying of the first fertile egg was 19 hours. The duration of fertility after intraperitoneal insemination varied from 2-25 days with an average of 10-20 days. Hatchability was in one isolated instance maintained to the 24th day.

—E. M. ROBINSON.

TRAUTMANN, A., & SILBER, H. (1944.) Abnorme Ausbildung der akzidentellen (sekundären) Geschlechtsmerkmale beim Hahn. [Abnormal development of secondary sexual characters in an incompletely castrated cock.]—*Dtsch. tierärztl. Wschr./Tierärztl. Rdsch.* 52/50. 301-304. 1944

A castrated cockerel failed to develop into a true capon and showed considerable hypertrophy of the comb and wattles and fairly well developed spurs. At autopsy a small piece of tissue was found in the position of the left testis and proved to consist of both normal and abnormal testicular tissue. The former showed spermatozoa, the latter Sertoli cells and a few spermatogonia only. This finding is taken to support Trautmann's view that the spermatogonia elaborate the male sex hormone. The authors suggest that a small amount of testicular tissue left behind at castrating underwent hypertrophy and brought about the normal development of the cockerel.—E. G. WHITE.

CLIFT, A. F. (1945.) Observations on certain rheological properties of human cervical secretion.—*Proc. R. Soc. Med.* 39. 1-9. 1945

Two rheological properties of cervical secretion, viz, flow-elasticity and "spinnbarkeit" (capacity to be drawn into threads) undergo cyclic variations during the menstrual cycle. The flow-elasticity (measured by means of the "menstroscope") and the "spinnbarkeit" are most marked at the time of ovulation, when the mucin is thin and transparent. It is believed that these tests may prove of value in the diagnosis of ovulation and in the study of sterility.—J. M. ROBSON.

FITZSIMONS, M. P. (1944.) Gynaecomastia in stilboestrol workers.—*Brit. J. Indust. Med.* 1. 235-236. [Abst. in *Bull. Hyg., Lond.* 20. 209, copied *verbatim*.] 1946

Enlargement of the breast has been reported during the course of stilboestrol therapy for prostatic cancer. Now a similar condition is described in 20 out of 38 men employed in the manufacture of stilboestrol, with periods of exposure varying from two weeks to 18 months. The first symptom was tingling of the nipple. Then a small area of thickening, often unilateral, developed under the areola. This might absorb, or enlarge into a nodule or hemispherical swelling, resembling the female adolescent breast. Tumour formation might be delayed for some months after removal from exposure. The breast tubules on biopsy, showed epithelial overgrowth with solid acinar formation. Areas showed an indistinct basal membrane, but nowhere was there any definite invasion of tissue by epithelial cells. When the risk was fully recognized, stringent precautions were adopted, but they proved ineffective. Finally, a new department was designed; here working clothes are placed in lockers kept for the purpose in a room which communicates with a shower bath. The workmen take a shower after each working spell, before outdoor clothing is resumed. The shift now only lasts from 7.30 a.m. to 1.30 p.m., and is restricted to two weeks, followed by an interval of one week before resuming exposure. Case histories are given of nine of the

affected men. The condition seems to have cleared up in every instance some time after withdrawal from exposure to risk.

HARINGTON, C. R. (1944.) Newer knowledge of the biochemistry of the thyroid gland.—*J. chem. Soc.* pp. 193-201. 1947

H. describes the discovery of our chemical knowledge of iodine-containing compounds in the thyroid and the biosynthesis of the thyroid hormone thyroglobulin. Early in the investigations it was found that di-iodotyrosine could be recovered from the thyroid and that this, together with thyroxine, probably accounted for the whole of the iodine of the thyroid. It appears that tyrosine is first iodinated and then two molecules of the compound so formed are coupled to give thyroxine; strong support for this theory is provided by experiments involving the use of radioactive iodine. Thyroxine can also be formed by the iodination of certain proteins, especially casein; this is of practical importance in providing a cheap source of thyroxine, which is valuable, for example, in the stimulation of lactation. The chemical stages in the formation of thyroxine are probably as above, starting from tyrosine. The possible mechanism by which two molecules of di-iodotyrosine are coupled to give thyroxine is discussed.—J. M. ROBSON.

EKMANN, C. A., & NAUMANN, B. (1945.) On the presence of mast cells in thyroid gland from guinea-pig and from man, under different conditions.—*Acta path. microbiol. scand.* 22. 271-277. [In English.] 1948

When the thyroid gland of the g. pig was stimulated by anterior pituitary thyrotropic hormone, the increase in epithelium was parallel with the increase in mast cells. The total number of mast cells in the gland was therefore greater than normal. In the gland of animals injected with thyroxine (and therefore inactivated) the total number of mast cells also increased. No mast cells were found in the human thyroid, either in normal subjects or in those with exophthalmic goitre.—J. M. R.

BELL, G. H. (1945.) Remarks on the growth and healing of bone.—*Brit. med. Bull.* 3. 76-79. 1949

This review summarizes experimental findings on bone growth and healing.

Investigations on the development of bones in tissue culture showed their power of self-differentiation. Femora of chick embryos 5½-6 days old, in spite of lack of blood supply, muscular pull and relations with other tissues, grew to three times their original length while still retaining their normal gross anatomy. Periosteum and endosteum formed bone *in vitro*, but a culture of fibroblasts was never observed to form bone.

In repair, the laying down of calcium runs parallel with the formation of osteoid tissue, provided the diet is adequate. The radiological appearance of fractures is of great significance. Decalcification, the removal of calcium without removal of the matrix, does not occur; the presence of an uncalcified matrix is due rather to lack of deposition of calcium salts. When both salts and matrix are removed by osteoclastic activity, a better term is de-ossification.—C. W. OTTAWAY.

SHEVCHENKO, N. A. (1940.) O reparativnoi regeneratsii epidermal'noi tkani slizistoï obolochki stenki rotovoi polosti. [Regeneration of epidermal tissue in oral mucous membrane.]—*Rabot. XIII Plen. vet. Sekt. Akad. sel'khoz. Nauk, Moscow*, 1939. [Collected Works.] pp. 18-19. 1940

S. describes the process of regrowth of epithelial tissue in wounds of the mouth and ear of the dog and rabbit. No new information is given.—L. LEVENBOOK.

LENTZ, W. J. (1945.) Anatomical memoranda on the udder of the cow.—*Vet. Ext. Quart. Univ. Pa.* No. 99, pp. 11–16. 1891

This is a review of the existing knowledge regarding the gross anatomy and histological appearance of the bovine udder. The continuity of the duct system from alveoli to teat canal is traced and reference is made to folds on the inner surface of the empty sinuses or cisterns. Many are contraction folds which are obliterated when the sinus is filled, whereas the structural folds remain.

In the young animal no alveoli are present. They are formed during pregnancy and reach their highest

See also absts. 1346 (blood proteins), 1347 (aortic abnormalities in dogs), 1440–1442 (hormones).

POISONS AND POISONING

BROWN, A., & TOMPSETT, S. L. (1945.) Poisoning due to mobilization of lead from the skeleton by leukaemic hyperplasia of bone marrow.—*Brit. med. J.* Dec. 1st. 764–765. 1892

Details are given of the case of a compositor in whom lead poisoning was caused by mobilization of lead from the bones by leukaemic marrow hyperplasia. Three months after the first symptoms were noted the blood lead was 280 µg. per 100 ml.; a month later it had risen to 455 µg. with a white cell count of 5,700 per cu.mm. After another two months and shortly before death the blood Pb level was 485 µg. per 100 ml. and the white cell count had risen to 147,000 per cu.mm. P.M. findings were typical of an advanced leukaemic process with marrow hyperplasia, splenic and hepatic enlargement and histological evidence of leukaemic infiltration of the viscera. Examination of the skeleton for Pb showed abnormally high values for the femur (293 p.p.m.) with only slightly increased values for the ribs and vertebrae; the values for the soft tissues, brain, liver, and kidneys were normal.—R. ALLCROFT.

FAIRHALL, L. T., DUNN, R. C., SHARPLESS, N. E., & PRITCHARD, E. A. (1945.) The toxicity of molybdenum.—*Publ. Hlth Bull. Wash.* No. 293. pp. 36. 1898

The toxicity of molybdenum compounds, such as might be encountered by workers on industrial processes, was found to be less, judged by clinical effects and histopathological findings, than that of many other metals of industrial importance. Large doses of molybdenum trioxide, calcium molybdate and ammonium molybdate were necessary to kill rats and g. pigs and still greater doses of molybdenite were tolerated. Inhaled dusts and fumes were not fatal in the amounts tested. Intraperitoneal injections were fatal to g. pigs. Molybdenum compounds were rapidly absorbed and excreted and storage was greatest, though everywhere transient, in kidneys and bones.—R. MARSHALL.

HUNTER, D., PERRY, K. M. A., & EVANS, R. B. (1944.) Toxic polyneuritis arising during the manufacture of tricresyl phosphate.—*Brit. J. Indust. Med.* 1. 227–231. [Excerpts from abst. in *Bull. Hyg., Lond.* 20. 208–209, copied verbatim. Signed: E. L. COLLIS.] 1894

Tri-ortho-cresyl phosphate is used in the recovery of phenol residues from gas plant effluents, and as an agent in the plastic industry to render the materials more pliable. It is known to be toxic and has been responsible in the past for several outbreaks of paralysis with bilateral foot- and wrist-drop. A number of animal experiments have established that this substance is toxic when swallowed or absorbed through the skin; new experiments are reported in which the drug was given orally to fowls and caused paralysis.

activity in full lactation. It is suggested the alveolar cell extrudes its contents into the lumen of the alveolus many times before it is cast off with the secretion and that, therefore, the production of milk is a true secretory process. As involution proceeds groups of lobules become inactive in turn until the organ is entirely inactive. It is pointed out that the presence of leucocytes in milk, if not due to infection, is probably the result of these retrogressive changes. With age, the number of lobules which remain permanently inactive increases and the udder becomes hard or "fleshy". The blood and nerve supply is discussed and an account is given of the formation of colostrum.—C. W. O.

HARVEY, J. M. (1942.) The detoxication of terpenes by sheep.—*Pap. Univ. Qd Dep. Chem.* 1. No. 23. pp. 10. 1895

Deaths among merino lambs during drought periods were thought to be due to poisoning by terpenes in essential oils contained in fallen or lopped trees. A number of terpenes were therefore administered to sheep and the urine and faeces were collected in a special urine belt and faeces bag (drawn and described). After administration of *p*-cymene, none was found unchanged in the faeces; cumic acid was found in the urine. After administration of *α*-phellandrene, none was found unchanged in the faeces; phellandric acid, *p*-cymene, carvotanacetone and possibly phellandral were found in the urine. After administration of piperitone none was found unchanged in the faeces; thymol, carvotanacetone, piperitone and probably diosphenol were found in the urine. After administration of *α*-pinene no acidic or phenolic and little neutral product was found: the isolation of urine constituents was incomplete. Prolonged pinene administration had toxic effects on liver and kidney.—R. MARSHALL.

STEFFENS, M. (1943.) Solaninvergiftung bei Hühnern. [Solanine poisoning in fowls.]—*Berl. Münch. tierärztl. Wschr./Wien. tierärztl. Mschr.* Sept. 3rd. 302–303. 1896

Hens in good condition otherwise died suddenly after eating sprouting potatoes which when green contain the alkaloid solanine. The birds ate well until just before death, the only symptom being difficulty of breathing. P.M. examination showed the heart to be enlarged and discoloured. There were no signs of infection and it is probable that the deaths were due to solanine.—E. BOYLAND.

KEHAR, N. D., & RAU, K. G. (1944.) Observations on the toxicity of *Rhododendron arboreum* to livestock.—*Indian J. vet. Sci.* 14. 177–178. 1897

Two samples of *Rhododendron arboreum* from different localities were used for feeding bulls, sheep and goats. Of these, one sample was toxic, the other not. Symptoms were frothy salivation, grinding of teeth, staggering gait, bulging of eye-balls and disinclination for food. Affected animals recovered without treatment once further ingestion of the plant was stopped. These experiments indicate that the plant is not lethally toxic to animals.—M. M. HUQ.

SNYDERS, S. L. (1945.) Mortality amongst cattle and sheep caused by mangels.—*J. S. Afr. vet. med. Ass.* 16. 10–13. 1898

Cases are recorded of merino sheep and cattle dying as a result of eating normal mangels. At P.M. examination there were general cyanosis, advanced hyperaemia and oedema of the lungs and acute catarrhal abomasitis; there was no gas in the rumen. In a feeding experiment

a sheep which received 2.4 kg. of the mangels died seven hours later. Subsequent feeding experiments proved negative. Nitrate poisoning sometimes results from feeding mangels, but the mortality in these sheep and cattle was apparently due to over-consumption.

—E. M. ROBINSON.

DUBASH, J., & TEARE, D. (1946.) Poisoning by *Amanita phalloides*.—*Brit. med. J.* Jan. 12th. 45-47. 1539

Details are given of four cases of human poisoning through consumption of *Amanita phalloides*, in mistake for the edible mushroom *Psalliota campestris*. Differences in the mycological character of these two species are described with illustrations. The active principles of *A. phalloides* are a haemolysin and a heat-resistant toxin. The main lesions found on P.M. examination were those of severe toxic action on the liver and kidneys with rapid appearance of renal and hepatic failure. The latent period between ingestion and onset of symptoms was 6-12 hours and the initial symptoms of vomiting, diarrhoea and collapse were very constant. The authors discuss briefly the value of symptomatic treatment, organic therapy and the possibilities of serotherapy.

—A. EDEN.

HOGAN, R. B., & EAGLE, H. (1944.) The pharmacologic basis for the widely varying toxicity of arsenicals. —*J. Pharmacol.* 80. 93-113. 1400

The theory has received considerable support that arsenicals owe their pharmacological activity to their being bound in host or parasite tissues by substances of essential biological importance, whose functioning is thus checked. A series of phenyl arsenoxides were found to be bound, in proportion to their toxicity, by blood cells *in vitro* and by blood cells and tissues after injection *in vivo*; the rate of excretion was likewise inversely relative to the toxicity. Acid substituted arsenoxides, though fairly toxic, were little bound by red blood cells and were rapidly excreted initially; a delayed diminution in rate of excretion and delayed death in mice suggested that these substances are converted in the body to more toxic substances.—R. M.

DRAIZE, J. H., WOODARD, G., FITZHUGH, O. G., NELSON, A. A., SMITH, R. B., JR., & CALVERY, H. O. (1944.)

See also absts. 1245 (ergot), 1244, 1242 (botulism), 1304 (midge bites), 1345 (dietary origins of haemorrhagic diathesis), 1386 (toxicity of stilboestrol), 1474 (lead poisoning).

PHARMACOLOGY, THERAPEUTICS AND DISINFECTION

*BODE, W. (1942.) Beiträge zur Wirkung des Natrium benzoicum bei kranken und gesunden Pferden. [The effect of sodium benzoate on diseased and healthy horses].—*Inaug. Diss., Hannover*. [Abst. from abst. in *Dtsch. tierärztl. Wschr.* 50. 512.] 1403

The effect of sodium benzoate was tested on 15 horses. In diseases of the respiratory tract the results were variable; in fevers, the temperature was reduced only slowly, or not at all. No harmful effects were observed with small doses; with prolonged dosage of larger quantities, joint and limb pains occurred. Some patients showed symptoms of intolerance after 2-3 doses so that it was not possible to continue the course. In no case did urination occur at the time of dosage or during the next 35 min. Dosage resulted in an increase in blood pressure (except in three horses suffering from infectious anaemia), an increase in the haemoglobin value and erythrocytes, but not necessarily in the leucocytes and an increase in serum globulin at the expense of albumin; no change was noted in the sublimate test.—R. MARSHALL.

Summary of toxicological studies of the insecticide DDT—2. 2-bis (*p*-chlorophenyl) 1,1,1-trichloroethane.—*Chem. Engng News*. 22. 1503-1504. [Abst. in *Bull. Hyg., Lond.* 20. 213, copied *verbatim*.] 1401

Toxicological investigations of DDT have shown that it is a poisonous substance which should be used only after adequate investigations have shown it to be safe for the particular use. (Since DDT in solution is absorbed through the skin, it should be handled with care and its use on the skin should be carefully restricted. The wide range of dosage over which toxic signs can be produced in animals shows that it is either irregularly absorbed or irregularly metabolized, thus making it difficult to establish an absolutely safe level for ingestion. DDT in solid form is not readily absorbed through the skin of animals. Subacute and chronic feeding experiments show that small amounts of DDT in the diet will produce toxicity in experimental animals, and that the safe chronic level would be very low indeed. Chronic experiments on several species of animals extending over periods of time longer than 50 weeks will be necessary before the chronic toxicity of this compound can be adequately assessed.)

PURCHASE, H. S. (1945.) Toxicity trials with the insecticide "666" on rabbits, sheep and a bovine. —*Vet. Rec.* 57. 211. 1402

Since the compound "666" [benzene hexachloride] is used as a locust poison when incorporated into a suitable bait at 3% and 5%, toxicity trials were carried out in which weighed amounts of the compound were suspended in a thin gruel of flour and water and given as a drench. Amounts of 0.5 g. and 1.0 g. per kg. body weight were not toxic for rabbits or sheep when given daily for three days; 3.0 g. per kg. given to an 18-month-old bull caused nausea and inappetence for 36 hours after which the animal appeared quite normal; 4.0 g. per kg. given once to two sheep caused no abnormal symptoms at all. These trials indicate that a sheep could eat 3-5 kg. and cattle 16-27 kg. of poisoned bait without harm. It is pointed out that since the bait is scattered over large areas in small amounts it is improbable that a grazing animal would pick up as much of this compound as was given in the trials.—R. ALLCROFT.

GLOCK, G. E., THORP, R. H., UNGAR, J., & WIEN, R. (1945.) The antibacterial action of 4:6-dimethoxytoluquinone and its fate in the animal body.—*Biochem. J.* 89. 308-313. 1404

Both 4:6-dimethoxytoluquinone and 4:6-dimethoxytoluquinol inhibit the growth of Gram-positive organisms growing in synthetic media, to a lesser extent when growing in broth, and even less when growing in blood. When injected into rabbits the quinone is rapidly conjugated with glycuronic acid and excreted. The glycuronides have no antibacterial activity [toluquinone itself is excreted as a conjugation product with amino acids]. Neither of the compounds appears to have any therapeutic value.—E. BOYLAND.

HUDDLESON, I. F., DUFRAIN, J., BARRONS, K. C., & GIEFFEL, M. (1944.) Antibacterial substances in plants.—*J. Amer. vet. med. Ass.* 105. 394-396. 1405

The antibacterial powers of species of *Allium* (garlic and onions) have been known for some time; the present authors found antibacterial activity in fresh

juices from *Rheum raphaniticum* (rhubarb), *Ribes vulgare* (currant), and *Riporia labrusca* (grapes). *Allium* extracts alone were effective in inhibiting *Bacterium coli* but all extracts inhibited *Staphylococcus aureus* and *Brucella abortus*. The active materials from all the plants were soluble in chloroform, ether, benzene and alcohol. It is suggested that the presence of such antibacterial substances in food may be of importance in the prevention of infection.—E. BOYLAND.

PEDERSON, C. S., & FISHER, P. (1944.) The bactericidal action of cabbage and other vegetable juices.—*Tech. Bull. N. Y. St. agric. Exp. Sta.* No. 273. pp. 82-100.

Shredding raw cabbage liberates a substance which is bactericidal towards the Gram-negative flora found on the surface of the leaves, towards *Bacterium coli* and to some extent towards *Staphylococcus aureus*. The potency is greater in some varieties of cabbage than others. The substance is different from that found in onions. It is suggested that the substance may have some effect in controlling the intestinal flora.—R. M.

JOHNSON, B. A., ANKER, H., & MELENEY, F. L. (1945.) Bacitracin: A new antibiotic produced by a member of the *B. subtilis* group.—*Science*. 102. 376-377. 1407
Bacitracin was produced by strains of *Bacillus subtilis* isolated from contaminated wounds and grown in broth or synthetic media. It inhibits the growth of Gram-positive organisms and of gonococci and meningococci. Encouraging results have been obtained by local application in the treatment of haemolytic streptococcal and staphylococcal infections in man.—E. B.

TIMONIN, M. I., & ROUALT, J. W. (1944.) Bacteriostatic activity of citrinin in vitro.—*Canad. J. publ. Hlth.* 35. 396-406. 1408

In vitro citrinin was found to exert bacteriostatic activity only on Gram-positive organisms. The addition of 1% glucose to the assay media raised its potency, which also varied with the method of purification. The addition of fresh horse serum to the assay media reduced the bacteriostatic potency of the drug but *p*-aminobenzoic acid was without effect. Toxicity tests revealed that 2 mg. of citrinin was lethal to 20 g. mice; the administration of 50 mg. per kg. body weight caused no ill-effect in rats.

The effect of glucose on the bacteriostatic potencies of antibiotic substances and the mechanism of resistance of bacteria to antibiotic substances are discussed.

—P. J. G. PLUMMER.

FLOREY, H. W., GILLIVER, K., JENNINGS, M. A., & SANDERS, A. G. (1946.) Mycophenolic acid: an antibiotic from *Penicillium brevicompactum* Dierckx.—*Lancet*. 250. 46-49. 1409

Mycophenolic acid has been isolated from the medium in which *Penicillium brevicompactum* was grown. *In vitro* experiments showed that the antibacterial effect is greater against Gram-positive than against Gram-negative organisms. The inhibitory effect is strikingly affected by the size of inoculum used. Mice were injected intravenously, subcutaneously and into the stomach and in all cases the antibacterial substance almost or entirely disappeared from the tissues and was not found in the urine, showing that there is considerable destruction or inactivation in the body. Mycophenolic acid has considerable power of inhibiting the growth of certain pathogenic fungi.

—E. BOYLAND.

FURTADO, A. R. (1944.) Pesquisa da atividade antibacteriana com 180 amostras de *Aspergillus Micheli*, 1729. [Antibacterial activity of 180 strains of

Aspergillus.]—*Mem. Inst. Osw. Cruz.* 41. 205-222. [English summary.] 1410

Using *Staphylococcus aureus* strain 553, F. studied the bacteriostatic activity of 180 strains of *Aspergillus Micheli* 1729 from the collection of the Oswaldo Cruz Institute.

Tests were made with 6- and 12-day-old *Aspergillus* broth cultures, 1 ml. being mixed with 4 ml. of the bacterial broth culture. Such cultures of 25 strains were inhibitory to bacterial activity; 32 strains were partially active and 120 strains inactive.—H. G. A.

ANON. (1944.) The production of penicillin—Parts I & II.—*Industr. Chemist*. 20. 592-599 & 649-658. 1411

I. This is a short account with several illustrations of the commercial methods of production of penicillin.

II. This continues a description with many illustrations of the process involved in producing penicillin and its extraction and purification. Owing to the labile nature of the penicillin, and the necessity at all times of preserving sterile conditions the process of concentration is difficult. The purification and concentration are effected by chemical and physical means. Use is made of the essential chemical property, *viz.*, the relative solubility of the substance under acid conditions in certain organic solvents, and the solubility of its metallic salts, sodium and calcium, in water.

—E. M. J.

GRACE, E. J., & BRYSON, V. (1945.) Topical use of concentrated penicillin in surface-active solution.—*Arch. Surg., Chicago*. 50. 219-222. [Abst. in *Bull. War Med.* 6. 66, copied *verbatim*. Signed: L. P. GARROD.] 1412

These authors agree that to secure persistent effects, penicillin solutions used for local application may need to be of higher concentration than those now generally employed. They also advocate admixture with a synthetic detergent, in order to aid dispersion, to exert a solvent action on necrotic material and to inhibit the growth of penicillin-resistant bacteria. The activity of penicillin is said to be unaffected by substances of this class. The solution recommended contains 4,000 units of penicillin and 0.1 per cent. sodium tetradecyl sulphate per c.c. Three cases are described in which septic wounds involving bone were treated by the instillation of such a solution with apparent success.

DEMEREK, M. (1945.) Genetic aspects of changes in *Staphylococcus aureus* producing strains resistant to various concentrations of penicillin.—*Ann. Mo. bot. Gdn.* 32. 131-138. [Abst. in *Rev. appl. Mycol.* 24. 382, copied *verbatim*.] 1413

In experiments with *Staphylococcus aureus*, strains resistant to penicillin were developed which retained that property after 20 transfers in broth. Experimental evidence indicates that resistance is not induced by the action of the penicillin, but originates as a change comparable to mutation. In any large population of bacteria there are some individuals resistant to certain low concentrations of penicillin. If this population is exposed to the action of such concentrations of penicillin, non-resistant individuals are eliminated while the resistant survive.

TODD, E. W. (1945.) Bacteriolytic action of penicillin.—*Lancet*. 248. 74-78. 1414

Bacteriolysis of pneumococci (Types I, II and III), *Streptococcus viridans*, haemolytic streptococci (Groups A, C and G) staphylococci and *Clostridium welchii* occurs when the organisms are in the phase of growth with maximal rate of multiplication. It is suggested that this is the real reason why penicillin is so effective in treatment of such infections.—E. BOYLAND.

ANON. (1946.) Penicillin in ophthalmology.—*Brit. med. J.* Jan. 5th. 17-18. 1415

Purulent infections of the outer eye but not intra-ocular inflammations respond readily to general sulphonamide therapy. Although some experimental evidence has been advanced that local applications of sulphonamides are of value in infections of the outer eye there is little justification for the widespread use of sulphonamides locally in such infections. Sulphonamide therapy of eye diseases should thus be largely dependent on oral administration. On the other hand, penicillin does not penetrate readily to the eye after systemic administration, but it is invaluable as a local medication in acute conjunctivitis, in blepharitis and in various septic inflammations of the outer eye. The tolerated concentration is about 2,500 units per ml. when used in the form of drops. No satisfactory penicillin eye ointment has yet been described. Injection of penicillin into the aqueous or vitreous humour or below the conjunctiva is unsatisfactory. There are indications that both sulphonamides and penicillin are effective against the larger viruses. There is no doubt that penicillin is effective against spirochaetes and it should be of value in treatment of ocular syphilis. If the difficulties of direct introduction of penicillin into the eye could be overcome, it would undoubtedly replace sulphonamides in the treatment of eye diseases.—E. BOYLAND.

MCADAM, I. W. J., DUGUID, J. P., CHALLINOR, S. W., & MCCALL, A. (1945.) Penicillin treatment of serous-cavity infections.—*Lancet*. 249. 843-848. 1416

Provided the dosage is sufficiently high, systemic administration of penicillin produces adequate bacteriostatic levels in the exudates in abscess pus and can thus be relied on by itself for the treatment of such local infections. Penicillin administered locally cannot be relied on to reach all sites of infection because of the pronounced tendency for localization to occur in infections of the serous cavities. Local administration may be used with advantage in addition to systemic administration.—E. BOYLAND.

PULVERTAFT, R. J. V., & YUDKIN, J. (1945.) Stabilization of penicillin solutions by phosphate. [Correspondence.]—*Nature, Lond.* 156. 82. 1417

Solutions of penicillin are stabilized by phosphate to such an extent that they can be sterilized by boiling for a few minutes. The optimum concentration of phosphate varies from M/100 to M/3 with different preparations of penicillin.—E. BOYLAND.

CAVALLITO, C. J., KIRCHNER, F. K., MILLER, L. C., BAILEY, J. H., KLIMEK, J. W., WARNER, W. F., SUTER, C. M., & TAINTER, M. L. (1945.) The benzyl ester of penicillin.—*Science*. 102. 150-151. 1418

The benzyl ester of penicillin is about three times as effective as penicillin in protecting mice against experimental streptococcal infection. Benzyl penicillin is less active when given orally than when given subcutaneously, but orally administered benzyl penicillin is about as effective as sodium penicillin given by subcutaneous injection.—E. BOYLAND.

SHWARTZMAN, G. (1945.) Concerted antibiotic effect of penicillin, methionine, threonine and methionine sulfoxide upon brucella, eberthella, salmonella, and shigella.—*Science*. 102. 148-150. 1419

The antibiotic effect of penicillin against Gram-negative organisms is increased by the addition of methionine, threonine and methionine sulphoxide. The effect of these amino acids is synergistic rather than additive.—E. BOYLAND.

ANON. (1946.) Mode of action of sulphonamides.—*Brit. med. J.* Jan. 26th. 132-133. 1420

Sulphonamides are usually assumed to act by inhibiting one or more enzymes concerned with *p*-aminobenzoic acid, which are essential for bacterial growth but direct proof of this hypothesis is lacking. The bacteriostatic action of sulphonamides can also be neutralized, by methionine, urethane and indefinite constituents of proteins, peptones, tissues and exudates. A second hypothesis is that sulphonamides inhibit oxidation-reduction enzymes. Sulphonamides inhibit many other cells besides bacteria, including fungi, protozoa, higher plants and mammalian tissues. Growth inhibition is generally accompanied by decreased respiration. Sulphonamides inhibit the division and respiration of fertilized sea urchin eggs in concentrations which have no effect on the respiration of unfertilized eggs. It is possible that the effect on bacteria is similar; that sulphonamides inhibit only that part of respiration which is necessary for cell division. This possibility means that the sulphonamides act as indifferent inhibitors like narcotics. Sulphonamides may overcome bacteria by "putting them to sleep" rather than by starvation.—E. BOYLAND.

SCHMITZ, K. (1943.) Effect of *p*-(aminomethyl)-benzenesulphonamide ("marfanil"). A chemotherapeutic with a fundamentally new mode of action.—*Acta path. microbiol. scand.* 20. 563-572. [In English.] 1421

This substance has a chemotherapeutic effect fundamentally different from that of the other sulphonamides. Its action is not antagonized by *p*-aminobenzoic acid, which is one factor responsible for the ineffectiveness of sulphonamides in the presence of pus and exudates; it has a uniform effect on bacteria which differ in their resistance to the other sulphonamides; the bacteria show no initial stage of growth, as with other sulphonamides and the effect is independent of the size of the inoculum, whereas other sulphonamides become ineffective with a large inoculum. Marfanil has no bacteriostatic action on tubercle bacilli (human type).—J. M. ROBSON.

*KÖHN, F. (1944.) Kasuistischer Beitrag zur Behandlung puerperaler Erkrankungen des Rindes mit Marfanil-Prontalbin. [Treatment of puerperal diseases of cattle with marfanil-prontalbin].—*Inaug. Diss., Hanover*. [Abst. from abst. in *Dtsch. tierärztl. Wschr./Tierärztl. Rdsch.* 52/50. 353-354.] 1422

Twenty cases in which there was local and general intoxication were treated with a marfanil-prontalbin mixture applied locally in the form of a powder; K. has the impression that a highly beneficial effect was produced. In cases of difficult parturition, prophylactic use of the mixture apparently proved of value.—J. M. R.

GUDIN, M., & NEIVA, A., Filho. (1944.) Tratamento da osteomielite por aseptasia integral e penicilina intrarterial. Sutura primitiva e secundária da ferida. [Treatment of osteomyelitis by aseptasia and intra-arterial administration of penicillin].—*Mem. Inst. Osw. Cruz.* 41. 163-166. [English summary.] 1423

The authors describe two cases of chronic osteomyelitic fistula successfully treated by the intra-arterial injection and local application of penicillin together with operation under sterile conditions. They attribute their success to the combination of both methods.

—H. G. ARAMBURU.

SEVERENS, J. M., ROBERTS, E., & CARD, L. E. (1945.) The effect of sulfonamides in reducing mortality from pullorum disease in the domestic fowl.—*Poult. Sci.* 24. 155-158. 1424

Experiments were carried out using a highly susceptible strain of Rhode Island Reds to determine the efficacy of a number of the less readily absorbed sulphon-

amides in the treatment of pullorum disease in fowls. The experimental birds were infected as day-old chicks by the oral administration of 0.25 ml. of a broth culture of *Salmonella pullorum* diluted so that each chick received approximately 50,000,000 organisms. The efficacy of treatment was estimated by the percentage reduction in mortality as compared with controls. Seven sulphonamides were tested. Sulphadiazine and sulphamerazine were the most effective. Sulphasuxidine, phthalylsulphathiazole, and sulphanilamide were the least effective, while sulphathiazole and sulphaguanidine were intermediate. A close relationship was found between the amount of free sulphonamide in the blood and the effectiveness of the drug. Female survivors which had been treated when one day old with sulphadiazine and sulphamerazine gave negative reactions to the agglutination test when tested at the age of nine months.—M. C.

UBATUBA, F., & VIEIRA, G. (1944.) Estudos sobre a bartonelose. I. A bartonelose dos ratos esplenectomizados e a penicilina. [Studies on bartonellosis. I. Bartonellosis in splenectomized rats and the effect of penicillin administration.]—*Mem. Inst. Osw. Cruz.* 41. 21-44. [English summary.] 1425

Bartonellosis was induced in 95% of 80 rats of the Oswaldo Cruz Institute by means of splenectomy. Haematometric readings were made before and after splenectomy; blood films and haematometric readings were made from peripheral blood.

The barium salt of penicillin prepared in the Institute and injected subcutaneously in the back had no action on the mortality rate, blood picture nor severity of the anaemia at a dose of 400 Oxford Units per kg. body weight.

Fifty-five references of bartonellosis are given and the influence of the spleen in the disease is discussed.—H. G. ARAMBURU.

SANDERS, A. G. (1946.) Effect of some antibiotics on pathogenic fungi.—*Lancet.* 250. 44-46. 1426

Penicillic acid, penicillin, helvolic acid, proactinomycin, cheiroline, aspergillic acid, gliotoxin and claviformin were tested against the growth in a liquid medium of a number of fungi pathogenic to man. Claviformin and gliotoxin were the most potent general inhibitors but gliotoxin is unstable.—E. BOYLAND.

HATCH, R. D. (1945.) Spergon—fungicide for summer eczema in dogs.—*J. Amer. vet. med. Ass.* 106. 278. 1427

On the hypothesis that the common grass fungus *Alternaria tenuis* may be responsible for summer eczema in dogs, a non-toxic fungicide was sought as a medicinal remedy. Spergon (tetra-chloro-*p*-benzoquinone), apparently non-toxic, was used alone, mixed with boric acid or mixed with starch each in equal quantities. In the cases selected for treatment acariasis was excluded by examination of skin scrapings from the affected areas. The mixture of spergon with boric acid powder was most easily applied but all gave comparable results, described as phenomenal in 15 cases of moist eczema. Optimum results followed application three times daily. About 50% of cases of dry eczema benefited, mainly due to cessation of the severe pruritus. In one case treated with spergon in an ointment base there was a slow but definite recovery.—H. I. FIELD.

CALVER, K. M. (1945.) Chemotherapeutic studies on experimental *T. congolense* infections.—*Thesis, Glasgow.* pp. 72. 1428

This thesis records experimental work on the treatment of *Trypanosoma congolense* infections in mice and investigations into the immunological properties of the trypanosome. Two strains of *T. congolense* were used

in the work, strain II being more virulent than strain I. Slight modification in incubation period, infectivity and course of the infection, occurred on passage of the strains through mice, the characters tending to become fixed in later passages. The stock strain, propagated by passage immediately upon the parasites becoming abundant, is referred to as the "acme strain".

The principal drug under test was phenanthridinium compound no. 897, of which a dose of 0.001 g. per 20 g. mouse given subcutaneously was well tolerated, but 0.0013 g. per 20 g. mouse killed almost 30% of mice. The drug was more effective at the "acme" of blood infection than when given earlier. This, it is claimed, indicates that immunity reactions play a considerable part in cure, which seems to be confirmed in that trypanosomes do not disappear from the blood for 2-3 days after treatment. When treatment was delayed until the chronic stage of infection was reached, 5-10 times the dose which cured cases in the "acme" stage was required. The minimum curative dose at the "acme" of infection was about 0.03 mg. per 20 g. mouse for strain I and 0.3 mg. for strain II, but occasional animals relapsed even with higher doses.

Relapses could be cured with a repetition of the initial dose and sometimes even with a smaller dose than that given initially. Cure of relapses frequently resulted from one retreatment and usually within six retreatments, though in some cases animals ceased to respond after repeated retreatments. Attempts to produce true drug-resistant strains were unsuccessful. The drug had only a very limited prophylactic action and no curative value when administered orally.

Tests of other phenanthridinium compounds revealed that the greatest activity was exerted by compounds with two amino substituents. The irritant effect of the drug on the tissues at the site of injection is an important consideration and compound no. 1553 which was outstandingly non-irritant in comparison with its therapeutic efficiency, proved more suitable for use in cattle than no. 897. Immunological investigations revealed that infections of strain I cured by treatment at "acme" conferred a solid immunity for 13 months (the longest interval tested) against inoculation with trypanosomes of the same strain from cases at "acme", but with strain II only 50% of similarly cured mice proved immune; there was no cross-immunity between the two strains. No immunity against reinoculation from chronic infections developed in animals cured at "acme". Little immunity against reinoculation from chronically infected mice was shown by animals cured in the chronic stage, though they developed the same immunity to reinoculation from "acme" infections as did animals cured at "acme". The antigens of the trypanosome were found to alter progressively during the course of a chronic infection, but a fixed immunologically chronic strain could be isolated by sub-inoculation into an uninfected mouse and subsequent passage as soon as parasites became abundant in the blood. Such strains revert in time to the "acme" type. It is suggested that the "acme" strain of *T. congolense* possesses constant immunological characters, or antigenic receptors (A receptors), the receptors in a chronically infected animal being regarded as becoming progressively A + B, A + B + C etc., which on cure give rise to the antibodies A, A + B, A + B + C, etc.

It was also shown that a greater degree of immunity was manifested to strain II parasites in the presence of antibody to strain I and that it might be expected that a more solid immunity would follow cure of a mixed infection with several strains of *T. congolense* than would develop after recovery from a single strain infection.—U. F. RICHARDSON.

HORNEY, H. E. (1945.) Reflections on the value of tartar emetic for the treatment of trypanosomiasis. —*Vet. Rec.* 57. 585-586. 1429

The successful use of tartar emetic in 1913 in the treatment of 50 cattle believed to have been infected with *T. congolense* is contrasted with the failure of the drug in the treatment of 14 infected cattle in 1941. It is suggested that the 1913 animals were on the way to spontaneous recovery, the chances of which are not small in an ox infected as the result of a brief exposure to tsetse flies, and that whilst the curative action of tartar emetic depends on its direct action on the parasites, there is always a residue of trypanosomes which escape; permanent, or sterilizing, cure can only be effected by the development of antibodies.

The animals treated in 1941 had been given injections of tartar emetic before passing through a "fly" belt and were again injected soon after emergence from this belt. A fortnight later several were found to have *T. congolense* infection and were given a course of three injections. Three weeks later half the animals had relapses; the majority of these were given a course of five weekly injections, only to relapse within a month after treatment ceased. It is suggested that this failure might be due to the early injections, which may have suppressed antibody formation. Although it is concluded that the treatment of *T. congolense* infections with tartar emetic is unreliable, it is also pointed out that it has contributed to the recovery of countless thousands of fly-struck animals.

In the case of *T. vivax* infection, which, it is claimed, is neither rare nor of low pathogenicity, it is very seldom that animals relapse which have received a course of five or more injections of tartar emetic.

—U. F. RICHARDSON.

FULTON, J. D. (1945.) Penicillin in leishmania infections. [Correspondence.]—*Nature, Lond.* 156. 203. 1430

Penicillin appeared to exercise no influence on the course of *Leishmania donovani* infections in hamsters, nor did the drug appear to have any action on cultural forms of leishmania, even at high concentrations.

—U. F. RICHARDSON.

— (1945.) Principles of malaria treatment.—*Bull. Army med. Dep.* No. 21. pp. 8. London: War Office. Reprinted in *Bull. War Med.* 5. 703-706. 1434

This is a review of new knowledge on the chemotherapy of malaria gained during the war. Of special veterinary interest are the definitions given of terms used in malaria therapy. These are reproduced as they may be of value in clarifying ideas on chemotherapy in animal infections caused by such parasites as *Babesia*, *Theileria* and, possibly, trypanosomes.

(1) Gametocyte prophylaxis is the prevention of the acquisition of infection by the mosquito because of the action of drugs on the gametocytes or on their precursors in the human body. (2) True causal prophylaxis is the prevention of the acquisition of infection by the human host through the action of drugs upon the sporozoites injected by the mosquitoes, or upon any intermediate stage of the parasite between the sporozoites and the blood asexual forms. (3) Suppressive treatment is the prevention of the development of the clinical manifestations of sub-patent infection by means of the continued action of drugs on the asexual blood forms. (4) Clinical cure is the cure of the clinical manifestations, should these develop. (5) Radical cure is the permanent elimination of infection by the destruction of all those forms of the parasite that are capable of continuing the asexual (pathogenic) cycle in the human host.—M. C.

FRIEDHEIM, E. A. H. (1944.) Trypanocidal and spirocheticidal arsenicals derived from s-triazine.—*J. Amer. chem. Soc.* 66. 1775-1778. [Author's summary copied verbatim.] 1432

The introduction of the s-triazine ring into the amino group of arsanilic acid enhances the trypanocidal and spirocheticidal properties of this compound, provided that at least one unsubstituted amino group is attached to a carbon atom of the triazine ring. The optimum effect is obtained in *p*-(2,4-diamino-s-triazinyl)-(6)-aminophenyl-arsonic acid. The corresponding arsinoxide and arseno compound are described.

GALLIA, F. (1944.) El efecto "in vitro" de la thiourea y otros compuestos químicos sobre el virus encefalomielítico tipo Venezuela. [The *in vitro* effect of thiourea and other chemical compounds on the Venezuelan equine encephalomyelitis virus.]—*Bol. Inst. Invest. vet., Caracas.* 2. 203-248. [English summary.] 1433

G. reviews briefly the problem of chemotherapy in virus diseases and draws attention to the relative success of treatment with a virus of large particle size. Experiments were made to determine the effect of urea, thiourea, propylene-glycol, glycollic acid, thioglycollic acid, the methyl ester of thioglycollic acid and urotropine on the Venezuelan E.E. virus isolated by KUBES & RIOS in 1939 [see *V. B.* 10. 174].

Different concentrations of the various chemicals were added to saline or serum-broth dilutions of mouse brain suspension. These mixtures were then inoculated intracerebrally or intraperitoneally into mice, intraperitoneally into g. pigs or on to the chorio-allantoic membrane of ten-day-old chick embryos.

In preliminary experiments the methyl ester of thioglycollic acid was superior in action to the other chemicals, but when used with serum-broth its action was diminished; in this medium thiourea was the most viricidal drug. The antigenic properties of the virus were destroyed by thiourea.—H. G. ARAMBURU.

GROULADE. (1944.) Sulfamidothérapie dans la traitement des formes nerveuses de la maladie de Carré du chien. [Sulphonamide therapy of nervous forms of dog distemper.]—*Bull. Acad. vét. Fr.* 17. 312-313. 1434

A clinical note in which G. describes four cases given an initial intravenous injection of 3 ml. of a 33% solution of sulphapyridine-sodium followed by oral administration of M. & B. 693 in tablet form; three animals recovered.—H. I. FIELD.

OSBERGHAUS, F. (1942.) Ueber den Einfluss der Sulfonamide auf die Infektion mit Variola-Vakzine-virus. [Influence of sulphonamides on infection with variola-vaccine virus.]—*Z. Immunforsch.* 102. 214-225. 1435

Experiments were carried out on rabbits and it was shown that sulphonamides had no curative effect on variola-vaccine infections.—J. FRANCIS.

ABRAHAMSE, A. A. (1944.) Gesarol, ein neues Fliegenbekämpfungsmittel. [Gesarol, a new fly-killing product.]—*Berl. Münch. tierärztl. Wschr./Wien. tierärztl. Mschr.* May 12th. 157-159. 1436

Investigations into the value of "gesarol" [D.D.T.] showed that it killed *Stomoxys calcitrans* and *Musca domestica* either by ingestion or contact and was capable of maintaining stalls fly-free for 23 days and of reducing fly numbers for two months. It is said to have been used for spraying fruit and vegetables and to be harmless to man and warm-blooded animals.

It is recommended to commence spraying with a 1% solution in the spring, at the same time cleaning

up faeces and refuse which may act as breeding places. Spraying should be repeated at monthly intervals over the fly season.—U. F. RICHARDSON.

WHITLOCK, J. H. (1945.) Anthelmintic bioassay of simple saturated hydrocarbons.—*Cornell Vet.* 35. 214-220. 1437

Uniform male albino rats were infected with standard doses of infective larvae of *Nippostrongylus muris*, treated with the test substance on the eighth day and killed on the tenth. The test showed that petroleum hexane, synthetic hexane, and cyclohexane are all effective anthelmintics. Increase in the number of carbon atoms in the chain or increased branching decreases the effectiveness of the hydrocarbons. Higher boiling petroleum distillates are ineffective because the constituent hydrocarbons have long and branched chains. Petroleum hexane is useful in conjunction with carbon tetrachloride, allowing a reduced dosage of the latter to be employed. The activity is increased by emulsification. Petroleum hexane is as effective as carbon tetrachloride in treating gastro-intestinal infestations (*Haemonchus*, *Trichostrongylus* and *Ostertagia*) in sheep but as it has a tendency to cause bloat, it will probably only be useful as an adjuvant to halogenated hydrocarbons.—E. BOYLAND.

SWALES, W. E. (1942.) Phenothiazine. Its role in the control of parasites of horses.—*Canad. J. comp. Med.* 6. 50-64. 1438

Phenothiazine is particularly effective against the strongylid nematodes which inhabit the caecum and large colon of horses. The dose for usual treatments should be about 1 oz. per 1,000 lb. body weight and can be administered as a bolus or in a loosely packed capsule. Constipated animals should be given a laxative at the same time. Some horses, particularly those of the lighter breeds, are extremely susceptible to relatively large doses.

The absorption of phenothiazine in the form of phenothiazone and its conjugation in the blood, causes a breakdown of many red blood cells and within 48 hours a haemolytic anaemia with consequent jaundice. The animal usually recovers from this effect, but for 30-40 days several waves of haemolysis and jaundice are liable to occur. A severe nephritis with albuminuria and haemoglobinuria or haematuria may occur. Tentatively, horses which have a large percentage of microcytic erythrocytes are classed as poor subjects for phenothiazine therapy. Attempted regeneration of the blood elements by the intramuscular injection of liver extract and by iron and copper therapy was not found to be successful. Blood or plasma transfusions were not tried, but are suggested.

S. states that, if used properly in the light of new knowledge, phenothiazine is actually safer for routine use than other highly effective anthelmintics. A selected bibliography contains 15 references.—THOS. MOORE.

TEMPERTON, H., & DUDLEY, F. J. (1945.) The use of phenothiazine in the control of worms among laying pullets.—*Harper Adams Util. Poul. J.* 30. 37-41. 1439

In view of the possible value of phenothiazine in the control of parasitic worms of poultry, it was decided to observe the effect of its prolonged use in the mash fed to laying pullets. Three groups were used consisting of 31 Rhode Island Red × Light Sussex pullets in each. Phenothiazine was incorporated in the mash fed to two groups, whilst the third group served as a control. One group received 400 g. of phenothiazine per ton of mash (equivalent to 19.5 g. per 50 kg.), as a regular component throughout the laying period and the other

group 4,000 g. per ton of mash (equivalent to 195 g. per 50 kg.) every third month.

The experiment was continued for 11 months; there were no adverse effects on health, egg production or body weight, though there was a slight reduction in mash consumption with the higher dosage level. Nineteen birds died during the experiment, but the distribution of the deaths did not suggest that the use of phenothiazine was responsible. At the conclusion of the experiment, the survivors of all three groups were killed and the alimentary tract of each bird was examined in detail. The drug appeared to play no part in the reduction of ascarids and although with the higher dosage rate no other worms were found, the lower dosage had no effect in reducing other types of worms, notably *Heterakis*.—J. D. BLAXLAND.

GREENE, R. (1946.) D.B.E.: a new synthetic oestrogen.—*Brit. med. J.* Jan. 5th. 9-10. 1440

This substance [a,a-di-(p-ethoxyphenyl)-p-phenylbromoethylene] is active orally and produces a prolonged effect when so given; it has a very low toxicity. Good results were obtained in the treatment of menopausal symptoms; relief of symptoms was maintained by weekly oral doses of 100-300 mg. The results in carcinoma of the prostate were unsatisfactory.

—J. M. ROBSON.

— (1945.) [Discussion on] Hormone therapy of cancer. [Speakers:—DODDS, E. C., MILLIN, T., RICHES, E. W., SIMPSON, S. L., WILLIAMS, WARD, O., & WRIGHT, D.] —*Brit. med. J.* Dec. 29th. 934-935. 1441

Administration of oestrogen to patients suffering from cancer of the prostate produces a beneficial effect in most cases. The disease is not cured but the growth of both primary and secondary tumours is arrested and degenerative changes may occur in them, resulting in softening. A similar effect is produced by castration. The growth of malignant prostatic tissue is stimulated by androgen and hence decreases after removal of the testicles. Oestrogens act by inhibiting the production of androgens (probably via an action on the pituitary) or by antagonizing their action on the prostate, or both. Acid phosphatase is an enzyme produced by an active prostate: its production is decreased by castration and increased by the administration of androgen. The acid phosphatase content of the serum is increased in cancer of the prostate with metastases and this is of diagnostic value. If treatment produces a fall in the serum acid phosphatase, the patient is responding and prognosis is good.—J. M. ROBSON.

GARNIER, G. (1945.) Relation of the gonadal hormones to certain dermatoses.—*Nature, Lond.* 156. 339-340. 1442

Certain skin conditions, such as eczema, psoriasis, acne, etc., may show improvement at certain stages of the sexual cycle in women, e.g., during pregnancy; suggestions, largely based on theoretical considerations, are therefore made for their treatment with sex hormones. Reference is also made to menopausal conditions, especially pruritus vulvae, which, as is well known, frequently respond well to treatment with oestrogens.—J. M. ROBSON.

WILLIAMS, R. H., & BISSELL, G. W. (1944.) Effect of topical application of vitamins and some other chemicals on the healing of wounds.—*Arch. Surg., Chicago.* 49. 225-227. [Abst. in *Bull. War Med.* 5. 481, copied verbatim.] 1443

A study was made of the effects of many substances, applied locally, on the rate of healing of wounds of uniform size in normal rats. The substances studied were vitamins A, C, D and E, thiamine hydrochloride,

nicotinic acid, riboflavin, calcium pantothenate, pyridoxine, biotin, hydrosuphosal, biodyne urea-sulfathiazole ointment, amino acids, adenosine, liver extract, cod liver oil, a "vitamin mixture" and sesame oil. The effect of sulfamerazine used in conjunction with most of these substances was also observed. No definite benefit was derived from the use of any of these substances, as judged by frequent observations of the wounds, their strength and the microscopic changes.

KERR, A. B., & WERNER, H. (1944.) The clinical value of a growth-promoting substance in the treatment of indolent wounds.—*Brit. J. Surg.* 32. 281-287. [Abst. in *Bull. War Med.* 5. 427, copied *verbatim*. Signed: J. N. DAVIDSON.] 1444

The authors describe the treatment of a series of indolent wounds in military patients in the Middle East with a preparation of sheep's heart which has been claimed by WERNER and DOLJANSKI to exercise a powerful growth promoting action on tissue cultures *in vitro*. It was made by extracting minced sheep heart muscle with four times its weight of normal saline in the refrigerator for several hours. The extract was mixed with twice its weight of 96 per cent. alcohol, and the precipitate which formed was centrifuged down and dried over calcium chloride *in vacuo*. The dried material was finely ground, and extracted with ether. It is known as heart-extract powder (H.E.P.).

Three categories of lesion were treated: (1) ulcers with or without preceding trauma or acute inflammation; (2) projectile wounds; (3) burns. All the patients were first treated on orthodox lines, with occlusive elastic dressings, sulphanilamide powder with paraffined tulle, "Vaseline" dressings, plaster of paris, flavine dressings, skin grafting or other methods, and all received a diet rich in protein and vitamins. Only when no further progress was made after at least three weeks on such treatment was the application of H.E.P. begun. All cases receiving H.E.P. thus consisted of infected, non-healing ulcers, in which failure to heal under orthodox treatment was not due to any recognizable factor. Daily, or on alternate days, the lesions were gently cleaned with saline and H.E.P. was sprinkled on them. The lesions were then covered with gauze soaked in saline or lightly impregnated with "Vaseline". The outlines of all wounds were traced on sterile "Cellophane", and the areas measured with a planimeter.

Details are given of 36 cases. Of these, 33 responded favourably to treatment with H.E.P. Fresh granulations appeared on the base of the wounds within a week of the commencement of treatment, and epithelial spread from the margins followed. The ultimate scars presented no unusual features. [The subsequent history of the scars is not given.]

The powder appeared to act by stimulating the reparative process and had no antibacterial effect.

In a few cases where several indolent wounds co-existed in one patient, treatment of only one wound with H.E.P. was followed by healing of that wound and of the others as well.

The authors suggest also that preliminary treatment with H.E.P. improves the "take" of transplants in skin-grafting.

VÖHRINGER, K. (1944.) Harnstoff als Wundheilmittel in der Tiermedizin. [Urea in wound treatment of domestic animals.]—*Berl. Münch. tierärztl. Wschr./Wien. tierärztl. Mschr.* Sept. 15th. 293-295. 1445

The observation that urea applied locally to wounds in human beings increased the rate of healing was

confirmed for animals. Application resulted in an increase in the lymph flow, together with hyperaemia; the wound became clean more rapidly and granulations appeared and grew quickly. It is suggested that the wound should be cleaned with a 10% solution of urea and the material then applied as a powder.—J. M. R.

GALLARDO, E. (1945.) Sensitivity of bacteria from infected wounds to penicillin: II. Results in one hundred and twelve cases.—*War Med. Chicago.* 7. 100-103. [Abst. in *Bull. War Med.* 5. 791, copied *verbatim*. Signed: L. P. GARROD.] 1446

Repeated examinations were made of the flora of 112 wounds or abscesses, in which infection had existed for a fortnight or more, and was being treated by penicillin administered systemically. Of 85 strains of coagulase-positive staphylococci so recovered, 12.9 per cent. were naturally penicillin-resistant and 9.4 per cent. acquired resistance during treatment. The value of routine tests of the sensitivity of the infecting organism, both before and during treatment, is emphasized.

*JONAS, K. (1942.) Ueber die Gewebsverträglichkeit einiger Desinfektionsmittel. [Tissue compatibility of certain disinfectants.]—*Inaug. Diss., Hanover.* [Abst. from abst. in *Dtsch. tierärztl. Wschr.* 50. 513.] 1447

The disinfectants lysol, quartamon, sagrotan, and "valvanol" were tested for tissue toxicity on g. pigs in different amounts and concentrations by intramuscular, subcutaneous and intradermal injection. Each substance in high concentration was severely irritant. Three test methods placed the substances in the same order of toxicity, i.e., lysol > sagrotan = quartamon > valvanol. It should be remembered that in practice, lower concentrations in temporary contact with living tissues are utilized. Thus, with the exception of lysol, no tissue damage need be feared from these preparations.—R. MARSHALL.

SCHÜTZLER, G., & SCHOEBE, W. (1944.) Die Veränderungen der intakten Haut nach der Behandlung mit "Durosept". [Changes in normal skin after treatment with "durosept".]—*Arch. wiss. prakt. Tierheilk.* 79. 134-139. 1448

Experiments were carried out on the healthy intact skin of g. pigs and horses to determine the effect of varying concentrations of "durosept". When a concentrated solution was used, marked changes occurred in the histological picture, the epidermis being loosened and the nuclei of the cells in the corium being partly destroyed so that it had the appearance of a net-like structure. After one and sometimes two applications of a 50% solution, marked changes were still noticed in the corium, but application of a 10% solution produced changes in the epidermis only.

It must be noticed that these experiments were carried out on healthy skin which, in all probability, has a greater power of resistance to "durosept" than skin affected with parasites.—R. F. G. SANDERCOCK.

MUDD, S. (1945.) Air-borne infection. The rationale and means of disinfection of air.—*Bull. N.Y. Acad. Med.* 21. 393-418. 1449

In view of the high loss to industry through absenteeism caused by infections of the upper respiratory tract, M. considers that the installation of apparatus for the inactivation of air-borne infective particles in hospitals, industrial units etc. is worth considering. He reviews three methods at present in use, *viz.* ultra-violet irradiation, the treatment of floors, bedding etc., with dust-preventing oils and the use of germicidal vapours.—R. E. GLOVER.

HYGIENE, PUBLIC HEALTH AND VETERINARY SERVICES

- I. KAY, H. D. (1943.) The National Milk Testing and Advisory Scheme.—*Agric. Progr.* 18. 5-9. 1450
- II. DAVIS, J. G. (1943.) The resazurin test in relation to the National Milk Testing and Advisory Scheme.—*Ibid.* 10-17. 1451

I. This is an account of the development of the National Milk Testing and Advisory Scheme formed as a result of the observed tendency to increased souring of milk, especially in bulk, since 1935 onwards. Following a severe loss of milk during 1941 a Committee of representatives from the Ministries of Agriculture, Food and Health, from the Milk Marketing Board, the National Farmers' Union, the Central Milk Distributing Committee and the County Councils' Association was appointed.

A nation-wide scheme was prepared with the following objectives:—to maintain a satisfactory keeping quality of all milk supplies, to reduce loss by souring, to salvage unsatisfactory milk when practicable and return rejected milk to the producer, to provide a suitable basis for pricing the different grades, to provide information for the Ministry of Food on facilities and efficiency of the depots, creameries, etc., and to provide information to enable county and provincial advisory services to be used to the best advantage. Two methods of sampling and testing milk were given for the purposes of grading. The scheme was a very large and formidable one, but difficulties associated with technique were being surmounted. All branches of the industry and all Government departments concerned were co-operating to achieve permanent improvement in the keeping quality of the nation's milk supply.

II. Of the methods used for testing milk under the scheme, there are the so-called "platform rejection test", i.e., the ten-minute resazurin test carried out by a certified tester at a creamery or depot, and the "routine" test at places where less milk is handled, whereby the milk is sampled by a standard procedure, kept for a definite short period, then tested in an approved laboratory by a slightly different resazurin test. Details are given of the chemical changes involved during a quantitative estimation of a milk sample and reasons for the choice of this test.—E. M. J.

- TICE, J. W., TISDALL, F. F., & MCCREARY, J. F. (1944.) A practical method for the supply of fresh milk to isolated R.C.A.F. stations.—*Canad. med. Ass. j.* 51. 541-543. 1452

Fresh whole milk with a butter-fat content of not less than 3.5% was dried and gas-packed in tins. If the tins are unopened, the product will keep for many months. No transportation difficulties are involved. To reconstitute the powder, one pound of powder is dissolved in water and brought to a total weight of eight pounds, this is thoroughly mixed with an electric beater and strained to remove undissolved particles. The re-constituted milk is aged for 24 hours in a refrigerator. The fluid milk resulting from this process is said to approximate closely to fresh milk in flavour, butter-fat and vitamin content.

The technique employed for drying the milk and packing the powder is not described.—THOS. MOORE.

- MENZIES, D. B. (1945.) An outbreak of typhoid fever in Alberta traceable to infected cheddar cheese.—*Canad. j. publ. Hlth.* 35. 431-438. 1453

An outbreak of typhoid fever occurred in southern Alberta in 1944. Eighty-three cases were reported from an area of 30 thousand square miles, the focus of infection being in the vicinity of Medicine Hat, in which city 35 cases occurred. Results of enquiries made in

Medicine Hat and the surrounding country, together with the widespread nature of the epidemic, eliminated milk, water and ice as vehicles of transmission. Further investigations revealed that all the sick persons had eaten fresh, green Cheddar cheese, which in almost every instance was purchased in the same food market and manufactured in a nearby factory. Measures were taken to prohibit further shipments of cheese from the suspected premises. The water supply for the factory was obtained from a large irrigation scheme and sufficient water had to be impounded in surface-storage reservoirs to serve during the winter months. This water was also used by several persons for household purposes without ill-effects. A survey at the factory showed that 96 families were shipping the milk, which was handled by 233 persons; of these, 19 had previously had typhoid and 51 had been in contact with it; 82 had had remote contact and 81 no contact. Three samples of stool and one sample of urine were obtained from each member of the first two groups and single samples of stool and urine from members of the third group. No testing was done on the remaining 81 persons. One "carrier" was detected in the first group: all three of her stool samples were positive. During the epidemic 122 blood specimens were examined: 15 of them yielded *Salmonella typhi* and eight of these failed to react positively to the Widal test at the time. *S. typhi* was not recovered from any of the cheese when examined 48 and 63 days after manufacture.—THOS. MOORE.

- MEYER, K. F. (1944.) Cheese borne epidemics of typhoid fever.—*Calif. West. Med.* 61. 137. [Abst. in *Bull. Hyg., Lond.* 20. 182-183, copied verbatim.] 1454

Meyer states that during the months of April and May the California State Health authorities were greatly baffled by an increased incidence of typhoid in four counties. All of the 77 cases were due to type C *Eberthella typhosa*. Epidemiologic inquiries revealed that all patients had consumed unpasteurized Cheddar cheese of the unripened variety. Persons who had eaten the cheese in cooked form were not attacked. The literature on epidemics of typhoid caused by cheese shows that the infective agent invariably reached the cheese through the use of raw milk accidentally contaminated by a carrier or an ambulatory patient. Adequate pasteurization of the milk, or pasteurization at any stage in the cheese making process, should render fresh, unripened cheese safe. The consumer and the industry continue to argue as to whether or not the flavour is destroyed or the quality is injuriously affected by heating the milk. Other means have been suggested. Since ripening requires weeks or several months, it has been stated that cured cheeses of the Cheddar type are safe if they are held in storage for one or two months. These conclusions are based on the studies of Wade and Shere, who showed that in artificially infected cheeses held at 60°C. the typhoid bacilli lived for from 34 to 36 days. Other investigators maintain that the manufacturer of Cheddar cheese cannot depend on the acids or on the antibiotic forces liberated by the ripening process to free his product from disease producing micro-organisms. In California the Agricultural Code has been amended to the effect that all cheese sold to the retail trade must be pasteurized or manufactured from milk which has been pasteurized, except cheese which has been allowed to ripen or cure for a minimum of sixty days. As a further protection, all cheeses in California must be labelled as to date, place of manufacture and grade.

STURA, C. A. (1943.) Aislamiento e identificación de la flora saprófita y patógena de las carnes, conservas y embutidos. Diagnóstico bacteriológico diferencial. [Identification of pathogenic and saprophytic bacteria in meat and meat products.]—*Gac. vet., B. Aires.* 5, 322-340. 1455

This article commences with a discussion on the importance of bacterial contamination of meat and meat products, and its role in the aetiology of intoxications and infections in man. A large part of the article is devoted to details of the tests used in identifying the bacteria isolated. A list of these bacteria is given. It includes members of the genera *Bacillus*, *Clostridium*, *Salmonella*, *Eberthella*, *Escherichia*, *Proteus*, *Streptococcus*, *Staphylococcus*, *Corynebacterium*, *Diplococcus* and *Aerobacter*.—I. W. BROCKLEHURST.

WESTPHAL, W. (1943.) Zum Keimgehalt gesalzener Därme. [The bacterial flora of salted intestine.]—*Z. Fleisch- u. Milchhyg.* 53, 102-107. 1456

W. reviews the literature and describes his results in the examination of specimens of salted intestine from cattle and pigs selected at random at different seasons of the year from sausage manufacturers. 1 g. samples of various sections of each intestine were cut up, suspended in broth and shaken; the suspension was inoculated into various culture media, incubation being under both aerobic and anaerobic conditions.

The number and variety of organisms isolated were considerably smaller in salted than in fresh intestine, but on the whole the same types of bacteria were found in both. Only two anaerobic species could be demonstrated.—E. KLIENEBERGER-NOBEL.

WUESTENBERG, R. W. (1945.) Intestinal diseases versus ranch technique.—*Amer. Fur Breeder.* 18, No. 3, 54 & 56. 1457

A popular article stressing the importance of hygiene in the handling and preparation of foodstuffs and the prevention of disease in fox farms.—M. C.

SNOW, D. (1945.) Mould deterioration of feeding stuffs in relation to humidity of storage. Part III. The isolation of mould species from feeding stuffs stored at different humidities.—*Ann. appl. Biol.* 32, 40-44. [Abst. in *Rev. appl. Mycol.* 24, 381-382, copied verbatim.] 1458

In this further account of studies on the mould deterioration of feeding stuffs stored at different humidities, the author states that the moulds most likely to occur in commercial storage are those able to develop at humidities of 85 per cent. or less. *Penicillium* species were unable to grow below 75 per cent. R.H., and flourished only at or above 85 per cent. R.H., whereas *Aspergillus* species developed in a very restricted moisture supply. *A. echinulatus*, *A. repens*, and *A. ruber* developed at humidities of 70 per cent. and under; *A. chevalieri* and *A. amstelodami* at 80 per cent. and over; *A. candidus*, 70 per cent. and over; *A. penicilloides*, 75 per cent. and over; *A. versicolor* and *A. sydowi*, 85 per cent.; and *A. niger*, 90 to 100 per cent.

At humidities under 80 per cent. the limited number of species able to develop often required long latent periods before spore germination could occur. At humidities over 80 per cent. a succession of species developed on many samples. At 100 per cent. R.H., for instance, members of the Mucorales established themselves in two or three days and were the dominant mould present. After a week, however, members of the *A. glaucus* group and *Penicillium* species grew rapidly on these samples, and became the dominant moulds at the expense of the Mucorales. *A. niger* did not appear until nearly two weeks had elapsed, while

the slower-growing forms such as *A. candidus*, did not develop until after three weeks. Some members of the Fungi Imperfecti, e.g., *Sporotrichum* sp., were not evident early in storage, but later provided the dominant moulds on many of the samples stored at high humidities. Species well adapted to growing on feeding stuffs, such as members of the *A. glaucus* group and, at 85 to 100 per cent. R.H., *Penicillium* spp., developed at the expense of species less well adapted.

Infection may, conceivably, occur in the field, during processing, or during transit or storage of the raw material or the processed feeding stuff. Some of the fungi isolated could, probably, have been traced to the country of origin of the original plant constituents of the feeding stuffs, particularly in the case of imported oil-seed cakes manufactured in tropical or sub-tropical countries; *A. chevalieri* is a common contaminant of foodstuffs from such parts. Feeding stuffs manufactured in Great Britain from imported materials are partially sterilized by the heat treatment received during processing, but mould contamination readily takes place afterwards from the machinery, workers' clothing, sacks, and the air in the storage rooms.

The range of feeding stuffs from which *Aspergillus* spp. and *Penicillium* spp. were isolated was as follows. *A. repens* was obtained (at 67 to 100 per cent. R.H.) from bone meal, bran, dried grass, groundnut cake, linseed cake, locust beans [*Ceratonia siliqua*], oats, and Scotch beans; *A. ruber* (at 70 to 100 per cent.) from bran, groundnut cake, linseed cake, locust beans, and Scotch beans; *A. chevalieri* and *A. amstelodami* (at 80 to 100 per cent.) and *A. echinulatus* (at 65 per cent.) from linseed cake. Of species outside the *A. glaucus* group, *A. candidus* was isolated (at 70 to 100 per cent.) from bran, linseed cake, locust beans, and oats, *A. penicilloides* series (at 75 to 100 per cent.) from bone meal and oats, *A. versicolor* (at 85 to 100 per cent.) from linseed cake and oats, and *A. sydowi* (at 85 to 100 per cent.) and *A. niger* series (at 90 to 100 per cent.) from linseed cake.

Paecilomyces varioti was obtained from palm-kernel cake stored at 70, 85, 95, and 100 per cent. R.H., *Penicillium spinulosum* from linseed cake, oats, and palm-kernel cake at 75 to 100 per cent., *P. luteum* series from palm-kernel cake at 90 to 100 per cent., *P. cycloptium* from linseed cake and palm-kernel cake at 90 to 100 per cent., and *P. rugulosum* from palm-kernel cake at 100 per cent.

The frequent occurrence of the small-ascospored species of the *A. glaucus* group particularly *A. repens* and *A. ruber* on such a wide variety of feeding stuffs, at humidities of 67 to 100 per cent., indicates that these species are those best adapted for growth on materials in which the moisture supply is limited. Mould damage to feeding stuffs in commercial stores is probably mainly due to these forms, but under conditions of prolonged high humidity (over 85 per cent.), other species of *Aspergillus* (e.g., *A. sydowi* and *A. versicolor*), and of *Penicillium* and other moulds can become established.

SNOW, D., & WATTS, P. S. (1945.) Storage of oilcakes. Experiments with sulphonamide E.O.S. and propamidine as preservatives.—*Food (Hannah Dairy Res. Inst.)* Reprint 161. pp. 3. [Abst. in *Rev. appl. Mycol.* 24, 161, copied verbatim.] 1459

After pointing out that when feeding-stuffs have to be stored under unsatisfactory conditions, the relative humidity cannot always be maintained below the safe level of about 70 per cent., and that in such cases the use of a non-toxic preservative might increase the storage life, the authors describe experiments in which sulphonamide E.O.S. and propamidine were applied to linseed cake by (a) incorporating fixed amounts in ground

samples, and (b) spraying 1 in. cubes of the cake with solutions in 80 per cent. ethyl alcohol. The samples were then stored in desiccators at 25°C.

The results showed that at humidities above 80 per cent. R.H. the drugs markedly inhibited moulds (*Penicillium* spp. and members of the *Aspergillus glaucus* group). With both methods of application the effect was most striking with sulphonamide E.O.S., which incorporated at a concentration of 0.2 per cent. more than doubled the storage life of samples stored at 85 and 80 per cent. R.H. The storage life of cubes sprayed with a 2 per cent. solution of sulphonamide E.O.S. was two to three that of the control cubes sprayed with alcohol alone, and three to four times that of the untreated cubes. With both methods of application propamidate was less effective than sulphonamide

See also absts. 1233, 1234 (tularemia), 1237 (brucella allergy in veterinarians), 1274, 1275 (equine encephalomyelitis in man), 1320 1321 (trichinosis), 1460 (food poisoning).

TECHNIQUE AND APPARATUS

CHAPMAN, G. H. (1944.) A suggestion for the rapid presumptive examination of foods suspected of having caused staphylococcal food poisoning.—*Food Res.*, Ill. 9. 377. [Abst. in *Bull. Hyg.*, Lond. 20. 273, copied verbatim. Signed: W. G. SAVAGE.] 1460

The author points out that almost without exception food-poisoning staphylococci produce coagulase. Also, since this is present in cultures, it should be present in foods that have supported considerable growth of staphylococci, even though the organisms are no longer viable. He suggests the following as a preliminary sorting procedure. Emulsify a loopful, or more, in 0.5 ml. of bacto tryptose phosphate broth (which enhances the clotting power), and 0.5 ml. of citrated or oxalated rabbit plasma or human citrated or oxalated whole blood, incubate up to seven hours and examine hourly. The prolonged incubation is desirable to permit growth of pathogenic staphylococci in case the amount of coagulating principle should be inadequate in the original food.

WYNNE, E. S., & WILLIAMS, O. B. (1945.) Growth of *Eberthella typhosa* and *Aerobacter aerogenes* in association in tetrathionate broth.—*J. Bact.* 49. 629-632. [Authors' summary copied verbatim.] 1461

A strain of *Aerobacter aerogenes* which was moderately antagonistic for *Eberthella typhosa* was found to show less antagonism in tetrathionate medium than in plain broth.

DUTHIE, E. S., & WYLIE, J. A. H. (1945.) The influence of shaking on the *in vitro* production of soluble bacterial toxins.—*Brit. J. exp. Path.* 26. 130-136. 1462

Cultures of *Staphylococcus aureus*, *Bacillus megatherium*, and *Clostridium botulinum* were shaken during growth by means of a revolving horizontal table with an eccentric thrust so that regular, smooth agitation was achieved without frothing. Several strains of *Staph. aureus* were examined in Walbum's fluid medium using semi-solid medium as a control. The shaken cultures showed increased growth and produced higher yields of a lysin, β lysin and lethal toxin (mouse M.L.D.); the maximum yield occurred earlier than in the stationary cultures. The use of a gas mixture consisting of 20% carbon dioxide and 80% oxygen was also beneficial to toxin production. The production of enterotoxin was not affected, indicating that this was distinct from a lysin. Parallel assays of a lysin, lethal toxin and skin-necrotic toxin showed them to be present in constant proportions; this suggested that the reactions were due to an identical substance. Haemolysin production by

E.O.S. This was unexpected, as the former showed a greater fungistatic power than the latter in other workers' investigations.

Although both drugs are toxic, no ill effect need be expected from feeding oil-cakes containing 0.2 per cent. sulphonamide E.O.S., since the normal therapeutic dose given orally for mastitis in dairy cows is 4 oz. a day for 14 days. If 5 lb. of cake containing 0.2 per cent. of the drug were consumed daily, the daily intake would be only 1/25 of the normal therapeutic dose. By spraying a solution of the drug on to the surface of the cake (which is believed to be the better method), the amount ingested would be very much less.

These results warrant an investigation of the application of the drugs that should be carried out on a larger scale under commercial conditions.

B. megatherium was unaffected either by agitation or by an increased CO₂ and O₂ content of the atmosphere. Cultures of *Cl. botulinum* produced a decreased amount of toxin when shaken in an anaerobe jar.—J. KEPPIE.

BERNHARDT, E. (1944.) A simplified method for culturing fungi from the scalp.—*New Engl. J. Med.* 231. 703-705. [Abst. in *Bull. Hyg.*, Lond. 20. 235, copied verbatim. Signed: J. T. DUNCAN.] 1463

To help practitioners who have not the service of a mycological laboratory, the author describes a simple culture medium for the isolation of ringworm fungi, which can be prepared in the home. This medium consists of: rice (previously washed with two changes of water) 5 cc.; water, 25 cc.; 1/10,000 aqueous solution of gentian violet, 0.8 cc. The materials are placed in a 100 cc. bottle provided with a cotton wool plug, and sterilization is effected by boiling the bottle in a saucpan of water for thirty minutes on three successive days. The addition of the gentian violet is necessary to ensure sterility, as the heating alone might not be effective. Infected hairs sown on this medium and incubated at room temperature were found to yield true cultures of all the common ringworm fungi tested; the identity of the fungus can be determined, provisionally, by microscopic examination of these primary cultures.

KAPLAN, D. (1944.) Studies on the cultivation of *Borrelia gallinarum* [*Spirochaeta gallinarum*].—*Thesis, Jerusalem*. Summary pp. 4. 1464

The medium which was finally selected because the increase in growth was 186 times the initial inoculum, consisted of 1,000 ml. of saline solution (5 g. NaCl, 2.5 g. Na₂HPO₄, 0.25 g. KH₂PO₄, 0.3 g. MgCl₂, 0.0005 g. FeSO₄ and 0.0005 g. MnSO₄), 4 g. Difco peptone, 1 g. glucose and 0.1 g. thioglycolic acid. Before inoculating, 1 ml. fresh rabbit serum and 0.6 ml. of sedimented fowl red cells suspended in an equal quantity of the saline were added to 10 ml. of the medium.

To obtain a standard inoculum, infected blood was centrifuged to remove corpuscles and one drop of the plasma added to 2.5 ml. of medium. Examination by the dark field method should reveal approximately one organism to 10-20 fields. The increase of organisms on culture in the standard medium was up to 186 times. The spirochaetes were cultured in this medium for 30 months, with passages every 2-3 weeks. During the first 13 months, cultures were virulent but after 16 months virulence was lost, although inoculation with culture still induced a specific immunity.

Glucose, an essential ingredient of the medium, was converted into lactic acid. Cozymase 6% (prepared from yeast) could replace blood cells, although growth was reduced, and a filtrate obtained in the preparation of cozymase could replace serum, as could 6% tomato juice. Extracts of chicken embryo and chicken liver increased growth, but could not replace blood cells or serum. A long list is given of other substances which failed to influence growth when added to the medium; these included biotin, riboflavin, vitamin A and nucleic acid.—U. F. RICHARDSON.

HILL, L. (1945.) A useful home made glass rod or tube cutter.—*J. S. Afr. vet. med. Ass.* 16. 14-19. 1465

H. describes an apparatus for cutting glass made with materials available during the war period.

—E. M. ROBINSON.

WADE, T. E. (1945.) Greater efficiency in steam pressure sterilization of surgical supplies.—*Amer. J. Surg.* 67. 98-105. [Abst. in *Bull. War Med.* 5. 750, copied *verbatim*. Signed: G. PAYLING WRIGHT.] 1466

After reviewing the principles of steam sterilization, the author records the findings in several experiments in which the period required for ensuring the sterility of large, tightly-packed objects was much reduced by following a specified programme of alternate admissions of steam into, and exhaustion of, the autoclave used. A device is described for expediting this alternation. Apart from increasing the amount of material sterilizable in any particular apparatus, the reduced period of exposure to high temperature lessens the deterioration of perishable articles.

I. SCHNEIDER, R. (1945.) Über die Entwicklung der

See also absts. 1270 (gelatin in erythrocyte aggl. test), 1270 (virus size determination), 1318 (fractionation of trichina larvae), 1342 (improved yoke for cattle), 1372-1374, 1376-1381, 1383 (artificial insemination).

MISCELLANEOUS

LOMINSKI, I., & THOMSON, G. R. (1944.) Relative sterility of the hands of certain metal workers.—*Brit. J. Indust. Med.* 1. 165-187. [Abst. in *Bull. War Med.* 5. 604, copied *verbatim*. Signed: L. P. GARROD.] 1470

Bacterial plate counts were made from multiple swabs taken from the hands and forearms of several classes of worker, in order to confirm an observation, made during a study of the flora of wounds, that the skin of the hands of certain workers handling certain oily metal filings carried far fewer living bacteria than

Ordonnanzhufeisen, Nägel und Stollen der Schweiz. Armee. [Horseshoes, nails and frost nails used in the Swiss army.]-*Schweiz. Arch. Tierheilk.* 87. 310-311. 1467

II. SCHNEIDER, R. (1945.) Hufeisen für pathologische Hufveränderungen und fehlerhafte Stellungen der Gliedmassen, alle aus dem Ordonnanzeisen Modell 1916 hergerichtet. [Pathological horseshoes according to the 1916 Swiss ordinance.]-*Ibid.* 312-315. 1468

I. This article consists of two figures with legends illustrating the horseshoes, nails and frost nails prescribed for the Swiss army by the ordinances of 1888, 1898, 1901 and 1916. In general, the tendency has been to use heavier shoes, to increase nail holes from three on each side to eight, and to provide more holes for frost nails (one at each heel and two at the toe).

II. A figure with legend illustrates 93 horseshoes for normal animals and for a great variety of pathological conditions. All the various types are taken from the army ordinance of 1916.—E. G. WHITE.

SUTTON, G. D. (1945.) Closure of pervious urachus in foals by subcutaneous ligature.—*J. S. Afr. vet. med. Ass.* 16. 59. 1469

A successful method of closing a pervious urachus by means of a subcutaneous catgut ligature is described. The needle with the catgut is worked round underneath the cord in the subcutaneous tissues. Four strands of the ligature are placed round the cord under the skin and the ligature is pulled up as tightly as possible and tied off. The ligature is absorbed in time and no after-treatment is necessary.—E. M. ROBINSON.

that of employees engaged in other kinds of work. It is suggested that this may be due to the oligodynamic action of fine metal particles, and that it may account for the rarity of sepsis following hand injuries in workers in metal filings. [Among the controls, the lowest bacterial counts were obtained in carpenters. The explanation offered for this is that moulds and "anthracoids" acquired from wood and sawdust have an anti-bacterial action. A perhaps more probable explanation is the presence of essential oils, such as pine oil, in the materials handled.]

REPORTS

GREAT BRITAIN. (1945.) Report of the Governing Body of the Lister Institute of Preventive Medicine, 1945. pp. 14. London: Lister Institute of Preventive Medicine. 4to. 1471

The report gives indications of the organization of the Lister Institute and its relations with other bodies such as the Medical Research Council, and of the problems which are being investigated. Among "bacteriological, immunological and pathological studies" reference is made to the work on *Trichomonas foetus* carried out by Dr. Robertson in conjunction with Mr. W. R. Kerr: they have shown that a circulating antibody may be present and animals may give a positive skin reaction following vaccination but may nevertheless be fully susceptible to trichomoniasis. The nature of two strains with different antigenic make-up from the typical and antigenically identical strains obtained from Belfast and Cambridge is being studied.

Other investigations concern the nature, storage

and cultivation of vaccinia virus, the chemical nature of specific blood group substances and the effect of injection of these substances into man, the nature of the antibiotic gramicidin, the large-scale separation of fibrinogen and prothrombin from human plasma and the freeze-drying of fluids of biological interest. Nutritional studies have shown that while the non-protein nitrogen of the potato alone is incapable of supporting growth it is able to supplement wheat gluten. Other examples of supplementing of food value occur with wheat protein and dried yeast protein and with "beef tea" and white flour proteins. The supplementary action of yeast and beef tea may be due to the lysine which they contain. The excretion of nicotinamide methochloride in man is greater than can be accounted for by the dietary nicotinamide and it has been shown that the excess is due to synthesis of the vitamin by the intestinal bacterial flora.—E. BOYLAND.

INDIA. (1943.) Annual report of the Imperial Council

of Agricultural Research for 1942-43. pp. 38. Items of veterinary interest, pp. 9-19. Delhi: Manager of Publications. 8vo. Rs. 2 annas 6 or 4s. 1472

At the fifth meeting of the Animal Husbandry Wing of the Board of Agriculture and Animal Husbandry in New Delhi in 1942, the following subjects were discussed:—veterinary education, dairy science, bacterial and virus diseases of animals and veterinary helminthology. The education committee recommended that the duration of a degree course in veterinary science be four or five years, depending upon the candidate's qualifications upon entrance.

A scheme to improve breeds of cattle by artificial insemination has been started; schemes have been financed for improvements in sheep and goat breeding and poultry keeping. The Council has also financed work to improve the nutritive value of rice straw by alkali treatment; such work is already in progress in Bengal. Investigation on the nutritive value of grains and oil seeds is being continued.

Two special schemes, one on anaerobic diseases of animals and the other on FOOT AND MOUTH DISEASE were sanctioned. The result of a special survey indicated that BOVINE TUBERCULOSIS was of rare occurrence in central, eastern and southern India except in conservancy bullocks, but that JOHNIE'S DISEASE was on the increase. An all-India survey on CONTAGIOUS ABORTION showed that infection was due to brucella and was comparatively rare on well managed farms. The importance of this infection is now being studied in relation to public health.

In order to encourage cattle breeders to develop higher milk-yielding strains of cattle, the Council has started milk-recording schemes in various centres.

See also absts. 1324 (committee on canine filariasis, Illinois State V.M.A.).

BOOK REVIEWS

CANTAROW, A. [M.D., Associate Professor of Medicine, Jefferson Medical College, Philadelphia] & TRUMPER, M. [Ph.D., Lt. Commander, H-V(S)USNR, Naval Medical Research Institute, Bethesda, Md.] (1944.) **Lead poisoning.** pp. xiii + 264. 4 figs., 21 tables. Numerous refs. Baltimore, Md.: The Williams & Wilkins Company. 8vo. 16s. 6d. 1474

Although this monograph deals with the question of lead poisoning from the human aspect and therefore considers chiefly the cumulative effects produced by continued exposure, the veterinarian will find that it contains a great deal of information that is of interest. Data from the enormous literature on this subject are reviewed and presented so as to give a comprehensive understanding of the nature, prevention and management of lead poisoning in man.

The various chapters deal with the absorption, transportation, deposition and excretion of lead, the pathology and pathological physiology of lead poisoning, the concentrations of lead in blood, body fluids and excretions, the clinical manifestations, the normal intake of lead, the treatment of lead poisoning, the occurrence of chronic lead poisoning, lead products in industry, and procedures for determination of lead. A good bibliography and index are included, making the book especially valuable for reference purposes.—R. A.

MAHER, F. T. [Ph.D., Assistant Professor of Pharmacognosy and Pharmacology]. (1944.) **The reticulo-**

Improvement in the production of good quality ghee is also under investigation. For the improvement of Indian wool, various sheep-breeding schemes all over India are being co-ordinated. Research on hides and skins is in progress.—M. K. SREENIVASAN.

INDIA, SIND. (1943.) [Report of Civil Veterinary Department, Sind, 1942-43.] pp. 10. Karachi: Govt. Press. 8vo. 1473

The report describes an investigation under the joint sponsorship of the Imperial Council of Agricultural Research and the Government of Sind of the incidence of animal diseases, particularly those which are obscure and believed to be peculiar to Sind.

Over seven thousand goats were vaccinated with formalized lung emulsion against CONTAGIOUS PLEURO-PNEUMONIA, reducing mortality to 1.32%. Goats similarly immunized failed to stand a test dose of virulent material. The disease was readily transmitted by intranasal insufflation and was similar to that found in Madras.

Transmission experiments suggested that the causal agent of "wah" was a filtrable virus. Infection could be transmitted by injection into the teat canal or by subcutaneous and intramuscular injections into the thigh and shoulder with mammary exudates from diseased goats. The incubation period is 5-11 days and the virus is destroyed at 60°C. in half an hour; "wah" resembles the contagious agalactia of sheep and goats described by GALLOWAY.

Other diseases of goats and sheep investigated were ANTHRAX, CONTAGIOUS ABORTION, SHEEP POX, "PITTO" or "GILLAR", RINDERPEST and MANGE. Investigation was also carried out on cattle diseases such as CONTAGIOUS ABORTION, RINDERPEST and on RANIKHET DISEASE [NEWCASTLE DISEASE] in poultry.—M. K. S.

endothelial system in sulfonamide activity. pp. 232. 23 figs., 40 tables. Numerous refs. Urbana, Ill.: University of Illinois Press. 4to. \$2.50. 1475

This monograph, which includes 612 references and 23 figures, advances evidence that the reticulo endothelial system is essential for sulphonamide activity in living animals. Rabbits were dosed with sub-toxic amounts of thorotrast so that the spleens, livers, and lungs were impregnated with the material.

[Thorotrast is a stabilized emulsion of thorium dioxide, containing 25% by volume and 19-20% by weight of thorium dioxide with from 16-19% of protective colloid. This colloid is a carbohydrate, described as a dextrin preparation. As a preservative, thorotrast contains 0.15% of methyl-p-hydroxybenzoate.]

Such rabbits, in which the r.e.s. was blocked, were unable to acetylate sulphonamides and were less resistant to infections of *Staphylococcus aureus* for 2-3 days after injection of thorotrast. Whereas sulphathiazole can protect normal rabbits against *Staph. aureus* infections it has no protective action in rabbits in which the r.e.s. is blocked. The variations in response of normal rabbits to staphylococcal infections and to sulphathiazole therapy of such infections may be due to individual variations in the functional activity of the r.e.s. MAHER considers that optimal chemotherapeutic effects are obtained when conjugation of sulphathiazole is maximal.—E. BOYLAND.

INDEX VETERINARIUS

The publication of *Index Veterinarius* commenced with the indexing of the literature of 1933. It is a complete index of current publications relating to veterinary research, public health, administration, education and other aspects of veterinary science.

The latest list of the publications indexed for this purpose was included in *Index Veterinarius*, Vol. 6. No. 1 (issued December, 1938) and also circulated with the *Veterinary Bulletin*, Vol. 9, No. 1.

About 10,000 references are indexed each year, each reference being suitably cross-indexed alphabetically under subjects and under names of authors.

As each half-yearly issue consists of a single complete alphabetical index of subjects and authors' names, a search through it involves a minimum of trouble, and all information required is readily found.

Each number contains the indexing done by the Bureau during the previous half-year, *i.e.*, No. 1, issued in December, covers the indexing done during the previous January to June.

The dates of issue of the two numbers of each volume are as follows :—

No. 1.—Issued December.	Indexing period previous January—June.
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Vols. 1 to 3 (1933, 1934 and 1935) of the Index were produced on a duplicator ; from Vol. 4 onwards it has been printed.

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